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DEPARTMENT OF DEFENCE (NAVY OFFICE)



REPORT
of the
HYDROGRAPHIC SERVICE

ROYAL AUSTRALIAN NAVY

for the year ended 30th June 1990

Issue Number 26

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REPORT
 by the
 Hydrographer, Royal Australian Navy
 Commodore J S Compton, AM, RAN
 for the year ended
 30th June, 1990

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Vice Admiral M W Hudson AC RAN
Chief of Naval Staff

Sir,

I have the honour to submit the Annual Report of the Hydrographic Service of the Royal Australian Navy. The report briefly describes the activities of the Service covering the period 1 July, 1989 to 30 June, 1990.

Notable achievements during the year include:

- * Preparation of a comprehensive program and activity statement for the transition to Program Management and Budgeting from July, 1990.
- * The formal acceptance into naval service of all four Survey Motor Launches and their commencement of work in pairs from their home base, HMAS CAIRNS.
- * Entering contract with GeoVision Australia for the provision of the oceanographic data base system HYDROCOMP.
- * Endorsement by the Concepts and Capabilities Committee of a major policy paper on the future direction and capabilities for military oceanography and meteorology.
- * Inauguration of the Naval Meteorological System NAVMET at the Naval Weather and Oceanographic Centre, NAS NOWRA.
- * Acquisition of additional headquarters office accommodation in North Sydney.

I have the honour to be

Sir

Your obedient Servant

A handwritten signature in dark ink, appearing to read "J S Compton".

J S COMPTON
Commodore RAN
HYDROGRAPHER RAN

GEOGRAPHICAL AND ENVIRONMENTAL SUPPORT

Manager: HYDROGRAPHER RAN

Component 215000

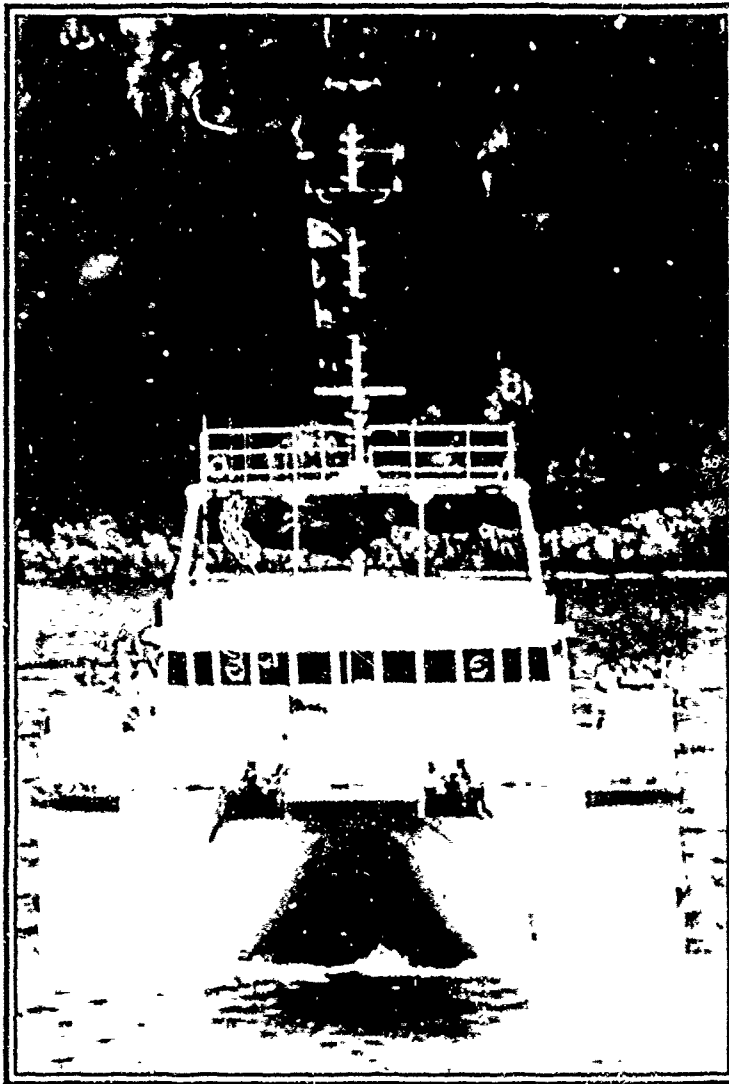
The Hydrographic Service, RAN has two prime objectives. The first is to provide the ADF with the geographic and environmental data base, products and services to enable maritime forces to be deployed and operated to the optimum at strategic, tactical and national task levels of activity. Secondly, the Service exercises the CNS role of National Hydrographic Authority in support of the safe, economic and expeditious movement of the nation's maritime trade.

During 1989/90, development emphasis has been given to the preparation for 'management by program' to commence on 1 July, 1990. The core elements of the program are national and defence hydrography, together with the defence operational applications of oceanography and marine meteorology described collectively as the Geographic and Environmental Support Component 215000 of the Navy's Maritime Operations sub program 210000.

Implementation of the component program will be achieved through the five sub-components of

- | | |
|--------------------------------------|----------|
| * Hydrographic Survey | - 215010 |
| * Oceanographic Survey | - 215020 |
| * Navigation Services | - 215030 |
| * Environmental Services | - 215040 |
| * Development and Corporate Services | - 215050 |

This year's Annual Report is arranged to accord with this program structure



HMAS PALUMA AT SEA OFF THE NORTH QUEENSLAND COAST

HYDROGRAPHIC SURVEY

Manager: Director Hydrographic Operations

Sub-Component 215010

HYDROGRAPHIC SURVEY

Sub-Component 215010

The assets of this sub-component are the field units of the Royal Australian Navy's Marine Science Force, together with a planning and tasking office in Sydney. Detailed reports of these units appear below.

The objective of this sub-component is to carry out hydrographic surveys in accordance with the five year survey program HYDROSCHEME. This year, surveys have been progressed off the south coast of Western Australia, off Arnhem Land, off Cairns, off Adelaide, in the Torres Strait, in Antarctica and in the south eastern waters of Papua. Survey areas completed are shown in Figures 1-7.

Undoubtedly, the major event during the year has been the delivery of the four new Survey Motor Launches (SML). These are catamaran hulled ships, 38 metres in length, with a crew of twelve. They have a modern and comprehensive suite of surveying equipment, and during their short period of service they have proved to be excellent survey platforms.

The Hydrographic Data Logging and Processing System (HYDLAPS) completed its first full year in service and has proved to be a most effective operational surveying tool.

SURVEY OPERATIONS

HMAS MORESBY

In a year which has seen the introduction into service of HYDLAPS and the first posting to sea of female Survey Recorders, MORESBY has undertaken a variety of surveys from Arnhem Land to Albany. Whilst suffering a number of teething problems, HYDLAPS has revolutionised the collection and processing of data on board ship. When its potential is fully realised, the system will significantly reduce the time taken to render surveys to the Hydrographic Office.

Following a period of HYDLAPS acceptance trials in the Perth area, the latter part of 1989 was spent in the Arafura Sea operating amongst the Wessel Islands. The Survey Motor Boat (SMB) continued HMAS FLINDERS' work in the English Company's Islands, and also undertook the difficult task of surveying the Cumberland Strait, with its 12 knot tidal streams, whilst operating from a boat campsite in Hopeful Bay.

In August MORESBY provided the RAN presence in Singapore, allowing the RAN unit, normally stationed in the area, to participate in Exercise 'Kangaroo 89'. Later, during her first visit to Cairns for 16 years, MORESBY met with HMAS FLINDERS, the first occasion on which the two ships have rendezvoused in 42 years of combined service.

A three month intermediate docking took MORESBY into 1990, and a return to Western Australian surveys. A large scale survey of the trials area for the Laser Airborne Depth Sounder (LADS) was undertaken by the ship, with the SMBs operating from HMAS STIRLING. This was followed by some work in the Albany area. A number of sonar contacts, possibly associated with the loss of HMAS SYDNEY in the vicinity of Dirk Hartog Island in 1941, were also investigated. No wreckage was identified.

Following a slightly longer than expected maintenance period at Easter, MORESBY deployed to conduct surveys off Arnhem Land.

HMAS FLINDERS

HMAS FLINDERS had a generally difficult year with a succession of defects and maintenance problems.

The ship was in refit at Cairns, from April, 1989 until late August. During that period HYDLAPS was installed. Trials and workup filled the remainder of August and September, after which FLINDERS departed Cairns for the Torres Strait area. Two months of survey operations followed, in an effort to determine an alternative eastern approach route to Torres Strait. FLINDERS returned to Cairns in late October for the three day Hydrographic Branch symposium, comprising personnel from MORESBY and FLINDERS and representatives from the Hydrographic Office and Hydrographic School. Following the symposium, FLINDERS returned to the Torres Strait survey, which was unexpectedly and abruptly curtailed by a main engine defect in mid November. This forced the ship to make an early return to Cairns, where she remained until the New Year.

FLINDERS conducted a survey of a proposed deep water shipping route in the Coral Sea, from February to April, 1990. Progress was hampered by poor atmospheric conditions in the survey area and the passage of Tropical Cyclone IVOR. FLINDERS returned to Cairns on 12 April for a scheduled leave and maintenance period.

FLINDERS again departed Cairns on 21 May, this time bound for Papua New Guinean waters. This deployment extended earlier RAN surveys in the Woodlark Island area. Visits, for self maintenance purposes, were made to Port Moresby, Rabaul and Guam.

HMAS PALUMA

During July and August, 1989, PALUMA was in the hands of Eglo Engineering in Adelaide, having resilient mountings fitted to the main engines in order to reduce noise levels inside the hull.

In September, PALUMA sailed from Adelaide on her maiden voyage for homeporting in Cairns. The ship visited Melbourne and Sydney for Navy Week celebrations. Highlights included an underway direct telecast of the "Good Morning Australia" program from Sydney Harbour, and being open for public inspection for three days at the Sydney Overseas Passenger Terminal. PALUMA then continued the passage north and visited Brisbane and Townsville, where MV Paluma (HMAS PALUMA II) provided an escort to a berth at the Great Barrier Reef Wonderland, and the ship's company visited the township of Paluma. PALUMA finally arrived in Cairns on 24 October.

During the remainder of the year, PALUMA conducted surveys and wreck searches in the Cairns area. In January the ship was slipped to rectify a stern tube misalignment. Further survey activities were then progressed to the south of Cooktown from Bee Reef to Endeavour Reef. The program was disrupted by the passage of tropical cyclone IVOR, and in May salvage assistance was provided to the American yacht SEA NEST, which grounded and finally broke up on Gubbins Reef. In May PALUMA commenced surveying the Two Way Route south of Archer Point in company with HMAS MERMAID. PALUMA then sailed from Cairns at the end of June for a survey in the Weazel Islands area.

HMAS MERMAID

On 4 December, 1989, at HMAS ENCOUNTER, Port Adelaide, HMAS MERMAID was named by Mrs. Angela Compton, wife of the Hydrographer. Shortly afterwards MERMAID was commissioned at a ceremony attended by the Honourable Kim Beazley, Minister for Defence and Vice Admiral M.W. Hudson AC RAN, the Chief of Naval Staff. Trials were successfully completed by 8 December. MERMAID remained at Port Adelaide over the Christmas period, to allow the shipbuilder, Eglo Engineering, to complete a number of minor outstanding deficiencies.

MERMAID departed Adelaide in early January, and arrived at her new home port of Cairns in early February. Enroute the ship visited the ports of Melbourne, Sydney, Brisbane and Mackay. She also visited Lord Howe Island and successfully completed a number of survey tasks in surrounding waters.

In late February, MERMAID proceeded from Cairns to the survey grounds near Cooktown, to assist HMAS PALUMA with the survey of a possible deep draught route west of East Hope Island. Other than a three week unscheduled slipping due to an engine vibration problem, the ship progressed the survey until mid-May.

A highlight of MERMAID's year was the pairing up with PALUMA, and the successful operational application of the Minimum Manning Concept of personnel and resource sharing through paired operations.

HMAS SHEPPARTON

HMAS SHEPPARTON was commissioned into the Royal Australian Navy on 24 January, 1990, at Port Adelaide (HMAS ENCOUNTER). The ship was named by Mrs Felicity Gaylord, Lady Mayoress of the City of Shepparton. Most of February was spent in the Adelaide area completing fitting out and working up the ship and ship's company. The ship departed Adelaide on 22 February for Spencer Gulf, to undertake benchmark surveys in support of the Laser Airborne Depth Sounder (LADS) Project.

SHEPPARTON, with HMAS BENALLA in company, departed Adelaide on Sunday 15 April for passage to HMAS CERBERUS at Western Port, Victoria. During the stay in Victoria both ship's companies visited their respective namesake cities for 'Freedom of Entry' ceremonies. Anzac Day was spent in Geelong.

SHEPPARTON arrived in Cairns on Friday 1 June, after an uneventful trip up the east coast of Australia visiting Sydney and Brisbane. The highlight of the Sydney visit was a sea day with personnel from the Hydrographic Office, staff from the Navigational Faculty HMAS WATSON, members of the Hydrographic Society and students from Technical Colleges embarked. The sea day was followed by a meeting of the Hydrographic Society in the chartroom of SHEPPARTON.

The year closed with a survey off Cairns.

HMAS BENALLA

HMAS BENALLA was launched, at Eglo Engineering's shipyard in Adelaide, on 31 January, 1990 and duly named by Mrs Judy Dennison, Lady Mayoress of the City of Benalla. The ship then underwent an intensive trials period before commissioning at HMAS ENCOUNTER on 20 March, 1990.

After commissioning, BENALLA continued her trials off Adelaide, and assisted HMAS SHEPPARTON in carrying out a series of benchmark surveys for the LADS Project. BENALLA departed South Australian waters in mid-April for her delivery trip, stopping on the voyage at Geelong, Western Port, Sydney and Brisbane arriving at her home port of Cairns on 1 June. The ship's company visited Benalla on 21 April and was granted the 'Freedom of the City'.

BENALLA sounded a trials area off Cairns in the last week of June.

Hydrographic Office Detached Survey Unit (HODSU)

The year commenced with the Detached Survey Unit embarked in the Department of Transport Vessel M.V. CAPE PILLAR, conducting a deep water bathymetric survey in the eastern part of the Solomon Islands Exclusive Economic Zone. The survey was a continuation of the South West Pacific Deep Water Bathymetric Survey Programme, which is sponsored by the Australian International Development Assistance Bureau (AIDAB). CAPE PILLAR sailed from Sydney on 30 May, 1989, returning to Brisbane on 15 September, 1989. During the course of the deployment, the ship made five visits to Honiara for logistics and recreation, as well as visiting several smaller islands in support of the local Solomon Islands Hydrographic Unit. This deployment was the last one to be undertaken by the CAPE PILLAR, which was put up for disposal on her return to Brisbane, ending the Unit's seven year association with the ship.

During the summer, the Unit was once again engaged in work in the Australian Antarctic Territory. A five man team sailed from Hobart on 8 January onboard the re-supply vessel M.V. POLAR QUEEN for passage to Davis, where they were to complete the boat survey of the approaches to Davis Station. While on passage to Davis, visits were made to Heard Island and to Mawson, where the opportunity arose for a trip up to the Antarctic Plateau. The Unit returned to Australia on 13 March onboard the Re-Supply Vessel M.V. ICEBERG. As a result of this season's work, the approach chart for the Davis Base is now substantially complete.

During the periods between deployments, the Unit has been based in the Hydrographic Office and has undertaken several small surveys in the Sydney Area.

HMAS CAIRNS Hydrographic Support Unit

The Hydrographic Support Unit at HMAS CAIRNS provides assistance to HMAS FLINDERS and the four Survey Motor Launches. Assistance provided includes equipment maintenance and support, loan of personnel, and the preparation, compilation and rendering of data. The Unit has also carried out a wharf survey at the Cairns Naval Base.

SURVEY PLANS

The RAN Surveying and Charting Plan, HYDROSCHEME is developed through consultation with the Department of Defence, maritime authorities and maritime commercial interests, and is revised annually. 'HYDROSCHEME 90/91' promulgates the plan for the period to 1995. Taking of hydrographic units, in accordance with the program, is carried out by the Survey Planning element of the Hydrographic Office.

Surveys Planned - July 1990 to June 1991

Cape Wessel to Cape Stewart; (Scale 1:50 000) HMAS MORESBY assisted by HMA Ships PALUMA, MERMAID, SHEPPARTON and BENALLA. Continuation of surveys off the northern coast of Arnhem Land, June until December 1990. (Area 1 on Figure 12)

Melville Island; (Scale 1:50 000/1:25 000) HMAS MORESBY, June to August 1991. A survey of coastal waters on the northern and southern coasts of Melville Island. (Area 2 on Figure 12)

Woodlark Island West; (Scale 1:100 000) HMAS FLINDERS, July to September 1990. A survey of the shipping route to the west of Woodlark Island. (Area 3 on Figure 12)

Nuakata Island; (Scale 1:10 000/1:25 000) HMAS FLINDERS, October to December 1990. A survey of coastal waters in the vicinity of Nuakata Island. (Area 4 on Figure 12)

Gulf of Papua; (Scale 1:50 000/1:100 000) HMAS FLINDERS, February to April 1991. A survey of the shipping approaches to the Fly River. (Area 5 on Figure 12)

Great North East Channel; (Scale 1:50 000) HMA Ships MERMAID and PALUMA, January to March 1991. A continuation of surveys to provide alternative routes to Vigilant Channel. (Area 6 on Figure 12)

LADS Trials; HMA Ships MERMAID, PALUMA, SHEPPARTON and BENALLA, January to July 1991. A variety of large scale surveys of test sites in Queensland and South Australian waters for use in the testing of the LADS during 1991. (Areas 7, 8 on Figure 12)

Antarctica; Scale 1:25 000 / 1:10 000. The Hydrographic Office Detached Survey Unit will undertake the survey of the 'Approaches to Casey' during December 90 to January 91. Area 8 on Figure 12.

TIDAL SECTION

The Tidal Section's work includes production of Australian National Tide Tables (ANTT), and support for cartographic work, survey operations, and special projects.

The 1991 edition of ANTT has been compiled and will include tidal height predictions for 75 standard ports, and one entry for predicted tidal streams. These predictions were produced by Flinders Institute for Atmospheric and Marine Sciences (FIAMS) (streams and 59 ports), Department of Marine and Harbours W.A. (4 ports), Hydrographer of the Navy (UK) (32 ports), Associated Surveys International (1 port), and the RAN Hydrographic Office (8 ports).

The Section has already started preliminary work on the 1992 edition of ANTT, which will include a more comprehensive listing of constituents for both primary and secondary ports (up to 21), and revised tidal level and time difference tables. The data required for this massive task comes from the section's own database, and from the National Tidal Facility recently established at FIAMS in Adelaide.

The supply of hydrographic survey datum adjustments to the cartographic section of the Office is again the most time consuming task of the Tidal Section, together with preparation of the tide information for survey operations. The RAN often surveys areas for which there are little or no tide data, and accurate tide measurement is of prime importance.

The issue of Mean Sea Level measurement is of considerable importance to Australia and the Pacific region, especially in view of the "Greenhouse Effect". Tidal Office, as a member of the Working Group of the Permanent Committee on Tides and Mean Sea Level, is closely involved in establishing a network of high accuracy tide gauges dedicated to mean sea level measurement.

RAN TRAINING PROGRAM

Hydrographic School

The RAN Hydrographic School continued with a full program of officer and sailor training. As well as Australian students, representatives from Malaysia, New Zealand, Vanuatu, the Solomon Islands and the Philippines attended. An increasing number of females joined the ranks of the "Surveying Service" during the year.

The continuing high levels of student throughput have delayed progress on training documentation. The introduction of HYDLAPS technology has required instructor resources to be employed in incorporating this new equipment into survey training. In addition, some of the basic skills required on the Survey Recorder have had to be reviewed. This has resulted in an updated course syllabus, which is now much more equipment specific. This has ramifications for the continued training of overseas personnel at the junior sailor level, and alternative training packages are being investigated.

Training has been supported by two Survey Motor Boats, a dedicated four wheel drive vehicle and a suite of surveying instruments including HYDLAPS, echo sounders, side scan sonar, EPF systems and geodetic instruments. The School now boasts three classrooms, a large chartroom, two offices, a store and a staff of six.

DEFENCE CO-OPERATION PROGRAM

Under the auspices of the Defence Co-operation Program (DCP), Hydrographic Advisers have been seconded to the Governments of the Solomon Islands and Vanuatu. Both advisers are Chief Petty Officer Survey Recorders. The Solomon Islands Hydrographic Unit was established in 1980 and the Vanuatu Hydrographic Unit was established in 1987.

Hydrographic Unit, Vanuatu

The Vanuatu Hydrographic Unit is now undertaking its first survey in compliance with modern hydrographic specifications. Previous surveys could only be classed as sketch surveys, due to lack of equipment. New equipment, and the provision, in 1989, of a survey vessel FV SPIA LAEN under the Defence Co-operation Program, have established the basis for modern survey operations.

In the early part of the year, a large amount of time was spent in local training to allow the crew to become familiar with their new vessel. Several trips were undertaken to train members in navigation, basic sailing, radio and small boat handling. Further training, in Australia and Vanuatu, will be undertaken in navigation, the Trisponder Navigation System and engineering subjects.

The present survey, Approaches to Paray Bay 1:2 000, is being carried out to clarify the depths in the channel being used by oil tankers. Future surveys planned are a proposed wharf survey in Havannah Harbour, Efate Island, Big Bay, Santo Island, and Lolowai, Aoba Island. It is also intended to gather 12 months of tidal observations for several locations, to increase the data available on Vanuatu.

Hydrographic Unit, Solomon Islands

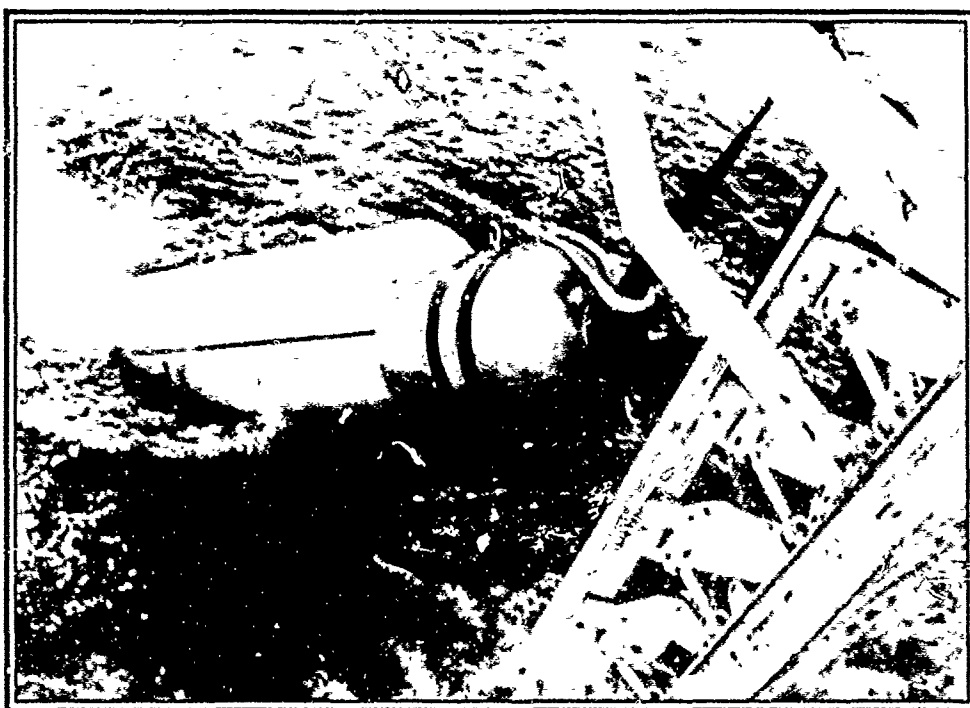
During 1989/90 the Unit conducted two surveys.

The Moli survey Choiseul (Western Province) was carried out at a scale of 1:5 000 to assess the feasibility of a logging vessel fully loaded (draft 10m) being able to negotiate the passage between Moli and mainland Choiseul, including the waters to the north west of the Island.

The second task was a survey of Ringdove Passage to Basilisk Harbour, Utapua (Temotu Province) at a scale of 1:10 000 for the purpose of upgrading chart coverage. Aveta Passage, north west of Utapua facing Ndende Island, was also compiled at a scale of 1:10 000.

In March, 1990 a survey from Pt Cruz to White River was conducted at a scale of 1:10 000 to upgrade existing charting of the Honiara area.

Halfway through May, 1990 the Unit commenced the largest survey task ever undertaken since the establishment of the Unit in 1980. The area to be covered is Kaube and Sandfly/Buena Vista Passage, Florida Islands. It is hoped that the DCP funded dedicated survey vessel SOLOMON OPHIR will carry out the bulk of the sounding after her delivery in September, 1990.



MARCONI UNDERWATER SYSTEMS LIMITED'S 'GLORIA' ABOUT TO BE STREAMED
FROM H.M.A.S. COOK

OCEANOGRAPHIC SURVEY

Manager: Director Oceanography and Meteorology

Sub-Component 215020

OCEANOGRAPHIC SURVEY

Sub-Component 215020

The objective of this sub-component is the collection and acquisition of a set of environmental data (13 environmental parameters per one degree square at least four times per annum) in Australia's Area of Direct Military Interest (ADMI). This year oceanographic data have been collected largely in the North West and North East maritime approaches to Australia.

The assets of this sub-component are the Oceanographic Survey ship, HMAS COOK, the Australian Oceanographic Data Centre and a planning and tasking office in Sydney. Detailed reports of these units appear below.

A major event during the year was the employment of HMAS COOK in the Coral Sea, Fijian Basin, East Australia Exercise Area and waters abeam of Adelaide, Albany and Perth, for Geological Long Range Inclined Aadic (GLORIA) trials. These trials proved successful and provided the RAN with a detailed (three dimensional) picture of the sea floor for these areas. Initiatives are in train to extend this coverage to other areas in the ADMI.

Another highlight for 1989/90 was the letting of a contract for the HYDROCOMP computer system, which will be installed in the Australian Oceanographic Data Centre. The system will provide the Centre with the facility to process comprehensive quantities of oceanographic data for input to the Maritime Environmental Data Base (MEDB), as well as produce a larger range of environmental products to meet Fleet requirements.

SURVEY PLANS

Planning for oceanographic surveys became more difficult as the year progressed. This situation occurred as a result of the change of emphasis being placed upon the activities of HMAS COOK. The primary task of supporting the Hydrographic Service's MEDB will require that external users of HMAS COOK will have to accept a much lower priority for their proposed research activities.

It is anticipated that oceanographic data gathering will be more actively supported by the Fleet in general. A project is in place to increase the number of vessels which can deploy bathythermograph probes. In addition, it is planned to replace HMAS COOK's dated Data Logging System within two years.

HMAS COOK

During the year the ship attained a high operational status, which is reflected in the fundamental statistics of 169 days underway, and a total of 37 075 nautical miles steamed.

HMAS COOK supported two significant areas of 'Oceanographic Research' - Defence related studies, and activities in support of the (Australian) civil marine scientific community.

In consultation with specialist staff from Sydney University's Ocean Sciences Institute, the Maritime Systems Division of the Defence Science and Technology Organisation conducted several research activities in north and northwestern waters, as well as in Torres Strait. The emphasis was on bottom type and movement studies.

The Marconi Underwater Systems Limited (UK) GLORIA side-scan sonar was embarked for geological investigations, during the periods July to September and November to December. The first of these activities, in areas off the north Queensland coast and the Fiji Basin, was in support of research

conducted by James Cook and Flinders Universities. The second, the Fiji Basin area of the southwest Pacific, supported research for the Committee for Co-ordination of Joint Prospecting for Mineral Resources in South Pacific Offshore Areas. In the period November to December, the GLORIA equipment was deployed in support of Defence interests, in waters off the South Australian and West Australian coasts.

Other Activities

Equipment malfunctions required the ship to dock twice during the period. Late September was spent in FORGACS Dock, Newcastle, and during January, a week was spent in the Captain Cook Graving Dock, Sydney.

Other notable events were:

- Commodore D.D. Farthing DSC RAN conducted the annual inspection while the ship was in Sydney during October.
- Commander G.V. Ryan RAN assumed command from Commander B.D. Hunt, RAN in January.
- The Maritime Commander, Rear Admiral I.D.G. MacDougall, RAN was embarked on 28 May.

MARITIME ENVIRONMENTAL DATA ACQUISITION AND QUALITY CONTROL

The functions of this element are undertaken by the Australian Oceanographic Data Centre (AODC), which manages the acquisition and quality control of specific data and information parameters of interest to the ADF. A number of programs have been initiated to discharge the responsibilities of this element.

Data Acquisition

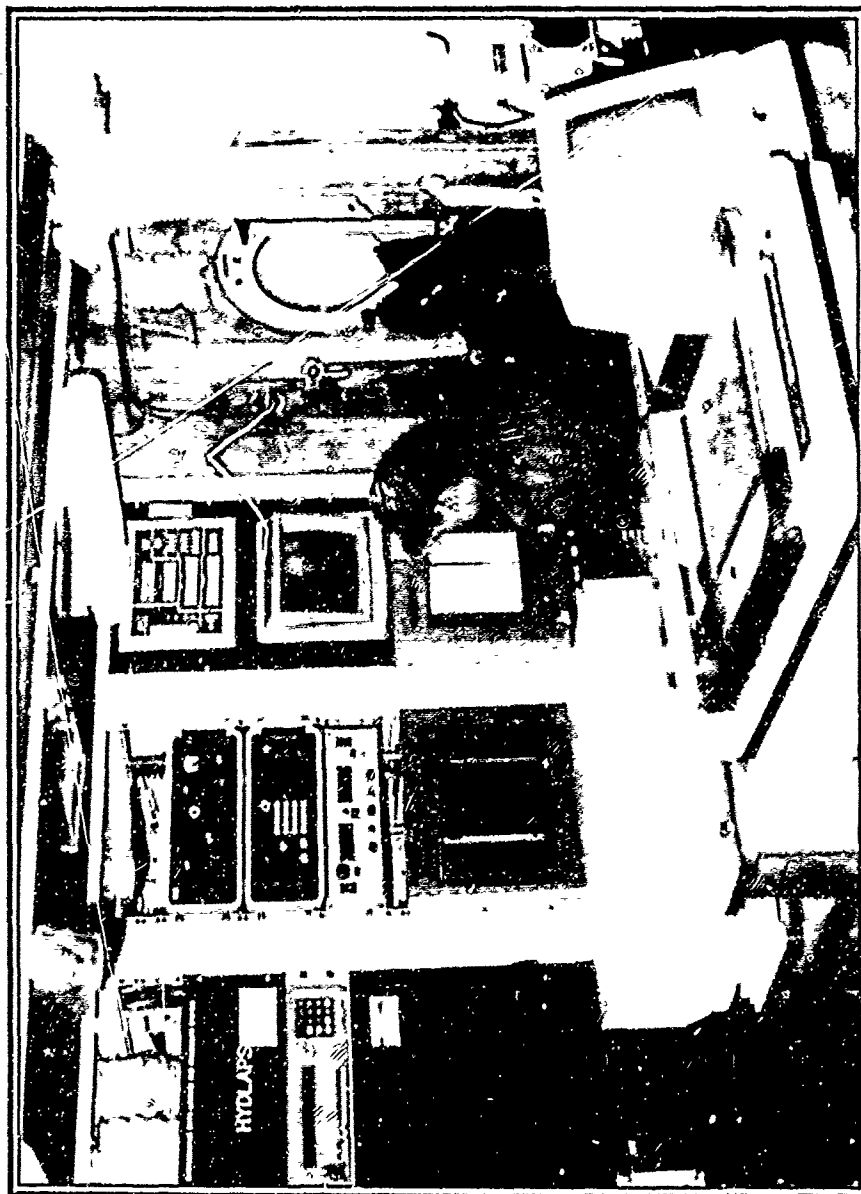
The AODC is approaching a number of national and international agencies to determine the extent and relevance of their data holdings to ADF operations. Data, particularly in digital form, are actively being sought for the development of AODC's climatological data archives. An AODC staff member has visited CSIRO's Division of Oceanography to establish formalized data exchange links for data collected by RV FRANKLIN. In the near future requests for data sets will be forwarded to the Japan Oceanographic Data Centre, the United States National Oceanographic Data Center (NODC) and the World Data Center 'A' (Oceanography) in order to obtain current data archives maintained by these organisations.

A project is presently being examined which will provide consultancy support to the efforts of acquiring digital oceanographic data from Australian research and academic organisations.

Quality Control

The AODC has initiated a major project to develop a sophisticated quality control system which will be implemented on the HYDROCOMP system in mid 1991. At this stage investigations are occurring into the requirements of a Quality Control System and the data standards and requirements of various international projects. Existing procedures, used internally and by other agencies, are being examined and a detailed specification will be developed next Financial Year.

Quality control of data is a very complex problem, particularly for a data centre which must ensure that a wide range of data are available to the client in various levels of quality assurance.



CONTROL CONSOLES FOR REAL TIME DATA LOGGING, SOUNDING AND
POSITION FIXING SYSTEMS IN HMS MORESBY

NAVIGATION SERVICES

Manager: Director Hydrographic Operations

Sub-Component 215030

NAVIGATION SERVICES

Sub-Component 215030

The elements of the Navigation Services sub-component are involved in the archiving of information; production and distribution of nautical charts; provision of updating services; and supply of navigational information in non-chart (textual) form.

The year has been unremarkable, and normal production figures have been achieved. Some useful enhancements have been made to the production system, but staff shortages have continued to be a problem. Detailed element reports are set out below.

NAUTICAL CHARTING

Chart Production and Revision

A total of twelve new charts were published during the year. Five of these were of the Timor Sea area, continuing the series commenced during 1988/89. The seven other new charts affected all Australian States and the Antarctic Territory. Details of new charts published are given at Appendix 2.

Five new editions were published to meet the requirement for major revision of existing charts. Details of these also appear at Appendix 2.

The hydrographic digital chart data base now contains over 100 chart files ranging in scale from 1:75 000 to 1:50 000 (port charts), 1:150 000 to 1:300 000 (coastal navigation charts), and 1:1M to 1:10M (route planning charts). The data base information comprises topography, hydrography and bathymetric surveys, navigation aids, nomenclature, maritime boundaries and marine and port information.

The national charting program was reviewed in February, 1990 to establish priorities for a five year plan. Included are significant charting requirements identified by categories and areas of navigational importance. There are large scale port charts (new editions), Australia and Papua New Guinea coastal navigation charts, charts of Australia's offshore territories, International charts, recently surveyed areas, new coastal developments and military exercise areas. The division of work in this charting program is approximately 70% Australia, 20% Papua New Guinea and 10% International. There is an emphasis on northern Australia, reflecting the current hydrographic survey program. 80% of this program will be new charts, the remainder will be new editions.

The flow of hydrographic survey documents and topographic mapping products from State and Commonwealth authorities and private sector surveys, affecting published charts, have again exceeded the staff resources available to maintain and update these charts. During the report period 112 topographic maps, affecting 61 charts, and 419 hydrographic survey documents, affecting 160 charts, have been received.

Australia has published 376 charts from a planned total of 728 contained within its internationally accepted area of charting responsibility. These are represented by 163 charts in Imperial unit measurement, and 213 charts in metric units. 41 British Admiralty published charts within Australia's area are still issued; 38 of these are within Australia's planned overall chart scheme.

Chart Maintenance and Printing

The chart maintenance section is responsible for the maintenance of the chart reproduction material (REPROMAT) used in the printing process, and for arranging printing schedules. During the year 169

revised charts were sent to the printer, and 122 were reprinted without revision. Low volume reprint runs are preferred, in order to reduce the number of corrections outstanding on any chart.

The maintenance section also compiles chart correction blocks (stick on graphics), and prepares special charts and graphics for the Fleet. During the year 36 blocks and 30 graphics were completed.

The correction of published chart stock, normally managed by hand correction services, has been successfully enhanced by the application of screen printing methods. 160 published charts, requiring 550 corrections (issued by Notices to Mariners) and involving 76 276 chart copies, have been corrected by screen printing, ensuring that navigational information has been accurately and promptly issued to the marine community. It is a Hydrographic Office objective that no chart shall be issued with more than three corrections outstanding. This is now being achieved for 90% of inventory.

Staffing

As a result of the 1988 Establishment Review, a reorganisation of the nautical charting element took place in November, 1989 in an endeavour to maximise the use of limited staff resources. The former four sections were disbanded and three new formations created, each headed by a Supervising Drafting Officer. The two former chart production sections were merged - the chart maintenance and revision section was merged with the system support section, and a specialised chart editing section was established.

Chart production has again been affected by a shortage of qualified and experienced Drafting Officers. At mid-year 50% of positions for this class of staff were vacant. The work is so specialised that positions cannot easily be filled by external recruitment. Nevertheless, numbers had been built up by year end. A number of junior members of staff are undertaking part time study, and currently are gaining experience through employment in the preparation of small compilations (blocks) in the chart maintenance group.

Training

Courses being undertaken by staff include Land & Engineering Survey Drafting Certificate (2) and Associate Diploma (6), Survey Drafting Associate Diploma (1), and Associate Diploma Cartography (1).

Two trainee drafting officers completed their approved studies during the period and are now eligible for promotion. One drafting officer is studying for a Bachelor of Applied Science. On-the-job training has been necessary for all drafting personnel below grade two level.

A practical cartographic course (4 months) was arranged for a draftsman from the Solomon Islands Hydrographic Unit, under the Defence Co-operation Programme. Under the same program, a Senior Drafting Officer was seconded for a short period to the Solomon Islands to advise on cartographic methods.

NAVIGATION SERVICES

Notices to Mariners

The Notice to Mariners section is responsible for issuing weekly booklets of chart corrections, to enable chart users to keep their charts up to date. Some 1 700 Notice to Mariners booklets are dispatched each week. The section has continued to receive a steady flow of data, resulting in 746 Notices being issued during the year.

Statistics for the 1989-90 period are as follows (1988/89 in brackets):

Notices to Mariners issued	746	(747)
Block corrections for charts	34	(36)
Notes for charts	51	(57)
Reproduction of BA blocks	3	(2)
Reproduction of BA notes	14	(11)
Reproduction of NZ blocks	0	(1)
Reproduction of NZ notes	2	(2)
Hydrographic notes from HMA Ships	78	(83)
Hydrographic notes from other sources	53	(52)

Vessels rendering five or more Hydrographic Notes during the year:

HMAS DENDIGO	10
HMAS DUNBURY	5
HMAS Jervis Bay	0
HMAS MORESBY	7
HMAS TORRENS	7

Sailing Directions

The responsibilities of the Sailing Directions sub-section include gathering and editing of material for the compilation of a series of volumes of sailing directions, covering the Area of Australian Charting Responsibility; advising on matters pertaining to maritime boundaries, and dealing with maritime nomenclature.

During the year data were provided to the United Kingdom Hydrographic Department for the ongoing revision of volumes covering the Australian Area.

A start was made to providing a desk top computing facility, to assist in the process of maintenance and revision of Sailing Direction's texts.

A decision has been made to commence the publication of Sailing Directions in Australia. It is intended to have nineteen volumes, 12 of which will cover the Australian mainland and Tasmanian coasts. Three volumes will cover the Coral and Tasman Seas, The Southern Ocean and the eastern part of the Indian Ocean. Four volumes will be devoted to Papua New Guinea waters. Priority in compilation is being given to those volumes covering the north coast of Australia and Papua New Guinea. During the year the Sailing Directions Officer made a five day visit to Darwin, researching material for the northern volume.

Unedited material, in digital form, is now held for the coast from Princess Charlotte Bay through Torres Strait to the Northern Territory/Western Australia border, the Southern Ocean, the Tasman and Coral Seas and Papua New Guinea. Publication deadlines will be determined when a full outfit of desk top publishing equipment is available.

Maritime Boundaries

Progress has been made in validating the port limits shown on large scale charts against those gazetted by State Governments.

Since the Australian adoption of the Marine and Estuarine Protected Area chart symbol, major MEPA boundaries have been inserted on some charts. This will be an ongoing task as future areas of the Great Barrier Reef Marine Park have management plans finalised.

Territorial Sea straight baselines continue to be inserted on the 300 000 chart series, and chart Aus 5060 was revised in order to show Australian Internal Waters.

Maritime Nomenclature

All new charts have had nomenclature verified against in-house sources. New charts covering Western Australian waters have been checked for nomenclature by the Western Australian Department of Land Administration.

A continuing interest in the origin of maritime names is reflected by the number of questions received from other authorities and the public.

The adoption, during the year, of modified revised print procedures for charts in the Australian series, has allowed changes in nomenclature, of a non-critical nature, to be inserted in charts at more regular intervals.

INFORMATION SERVICES

The Hydrographic Office Records and Library Section manages both hydrographic data and general library resources. The section holds hydrographic surveys of RAN and civilian origin, geodetic information, satellite imagery and aerial photography, and supports these with specialist library resources. The section's major task is to support surveying, charting and oceanographic activities in the Australian charting area.

During the year the Library has received 112 topographic maps affecting 61 charts, 419 hydrographic survey documents affecting 160 charts, and 12 items of remotely sensed imagery.

One new member of the staff joined the section during the year as a preliminary to the introduction of the Hydrographic Information System (HIS), the new data base and information management system.

CHART DISTRIBUTION AND SALES

The Chart Distribution Centre continues to function as the national distributor of marine navigation charts. Appendix 4 shows that, for the second year in a row, the revenue from sales has been close to one million dollars. This year the value of issues to the Defence Force has been included in the figures, in order to show the total value of services provided by the Hydrographic Office.

The Centre has become involved in promotional activities in a co-ordinating role. The first activity in 1989/90 was the map sellers exhibition in Brisbane, which two cartographic personnel attended with a display of charts and an explanation of the chart production process. A second display was organised for the Australian Cartographic Conference at Darwin in April. Both displays served to further the visibility of the Hydrographic Office and its products, which in turn promotes sea safety. Further development of advertising and promotional activities is planned.

The Distribution Centre continues to deal with requests for permission to reproduce published data in books and magazines. Several requests have been granted in the interests of public safety.

The manager of the Chart Distribution Centre visited agents in the south western part of Western Australia in May. These visits were intended to ensure that adequate services are available to the public, to investigate the granting of new agencies, and to obtain opinions on the service provided to agents by the Office.

OPERATIONAL FACILITY, CANBERRA

The Operational Facility, located in Canberra, comprises the assets transferred in 1955 from the Division of National Mapping Bathymetric Mapping Programme to the Department of Defence Hydrographic Charting Program.

TSMV FEDRINA was chartered for 120 days for surveys in the Great Barrier Reef region, between 13°S and 15°S. 100 days were spent on active survey resulting in the completion of five map areas. Compilation and cartographic production activities resulted in the printing of 33 maps. The status of the program is shown at Fig 11A and 11B.

During the year assistance has been provided to the Australian Land Information Group (AUSLIG), through the preparation of bathymetric compilations required for a set of scientific maps of the Antarctic Region. Work has also commenced on four bathymetric maps of the Exclusive Economic Zone (EEZ) of Vanuatu, on behalf of the Australian International Development Assistance Bureau (AIDAB).

Bathymetric survey activities have now been terminated, and plans for completion of the program will be incorporated into HYDROSCHEME.

ENVIRONMENTAL SERVICES

Manager: Director Oceanography and Meteorology

Sub-Component 215040

ENVIRONMENTAL SERVICES

Sub-Component 215040

The two elements of this sub-component, through the activities of the Australian Oceanographic Data Centre (AODC) and the Naval Weather and Oceanographic Centre (NWOC), are involved in the provision of maritime environmental products and services in support of the ADF's maritime environmental needs, as well as to meet national and international responsibilities.

The past year has seen a dramatic change to the modus operandi of the NWOC, with the coming on line of the Man Computer Interactive Data Access Computer system (MCIDAS) as well as the Naval Meteorological (NAVMET) system. Through these systems the Centre now has access to a larger meteorological data base, housed in the Bureau of Meteorology, Melbourne, and is capable of automatically plotting charts, as well as producing forecasts and displaying charts, in a digital format.

AUSTRALIAN OCEANOGRAPHIC DATA CENTRE

The AODC has undergone a major expansion during 1989/90. Staff numbers have been increased to 10, and additional resources, particularly Personal Computers, have also been acquired. These management procedures and computer systems have enabled AODC to more effectively meet its responsibilities. Some time has already been devoted to the development of task specifications and performance indicators, in anticipation of the introduction of Program Management and Budgeting in 1990/91.

Bathothermal Data

The AODC received 2 064 Expendable Bathothermal (XBT) profiles from RAN ships. Some 626 XBTs from HMAS COOK were rendered in a digital form, simplifying the tasks of entry into the main data bases.

During the year 3,312 analogue XBT traces were forwarded to the United States National Oceanographic Data Center (NODC) in Washington, for electronic quality control and digitisation. A proportion of this information has been returned on magnetic tape and is in the process of being merged with existing data.

XBT data have also been received from the CSIRO's vessel, RV FRANKLIN, and a large number of XBT profiles, in digital form, are in the process of being included in the main XBT data base. The data cover a number of areas around the Australian continent and are an extremely valuable contribution to the AODC data archives.

Data Holdings

In anticipation of the development of the HYDROCOMP system, a prototype data base has been developed. This data base, known as OCEANS, uses existing Hydrographic Office computer facilities, including a Geographic Information System package to store and retrieve the data sets. Existing data sets consist of the following formats:

- * Universal Bathythermal
- * Mechanical Bathythermal
- * Expendable Bathythermal
- * Nansen Cast consisting of:
 - * salinity
 - * temperature
 - * phosphate
 - * nitrate
 - * oxygen content

A computerised Climatological Atlas of the World Ocean, containing statistical information on predominantly temperature and salinity variables at standard depths, has been loaded onto existing Hydrographic Office computer systems. This atlas (produced by the US Geophysical Fluid Dynamics Laboratory) is extremely useful as a reference source, and it is being used to satisfy the more general queries for information. It is also being used as a standard reference for the quality control of temperature and salinity data.

A data management system, to organise the large quantity of data collected by HMAS COOK, has been developed. The parameters collected by HMAS COOK, and maintained in the inventory system include:

- * XBT data
- * SeaBeam data (Stabilised Narrow Beam Echo Sounder)
- * CTD data
- * Wave height observations
- * Wind direction and speed
- * Humidity
- * Bottom type data
- * Nansen cast observations
- * Bioluminescence observations

Services

The AODC has begun the production of a series of Regional Environmental Briefs for the waters of military interest to Australia, in conjunction with the Applied Oceanography Centre (AOC) of the Joint Maritime Warfare Centre (JMWOC) and Maritime Systems Division (MSD) of the Defence Science and Technology Organisation (DSTO). It was anticipated that one brief would be produced each year, however, due to the increasing workload of higher priority tasks, the AODC has not yet completed the first brief. While most of the work has been finished on the initial volume, final production is not expected to be completed until the end of 1990.

Two seasonally dependent Environmental Exercise Briefs were supplied to cover major Exercises such as 'Kangaroo 89'. Two complex Environmental Briefs were also prepared to assist Naval development projects (for example, the ASSTASS Project) and two Briefs were provided to the RAAF as environmental support for their maritime exercises.

The AODC received a large number of requests for information from the civilian community during the period. Many of these requests were responded to by telephone, although some resulted in the production of reports. They ranged from relatively simple requests to those requiring complex statistical analysis requirements. Some of the more substantial requests included:

* Provision of a detailed brief on the temperature and current regime for waters adjacent to the South Pacific island group of Tuvalu, to assess the environmental influence on the local fishing industry.

* Provision of sub-surface temperature data for the Australian coastal region to the Bureau of Rural Resources, in the production of an Australian Fisheries Resource Atlas.

* SeaBeam bathymetric data to James Cook University of North Queensland.

* Details of sub-surface topographical structure information for areas off the Queensland coast for use in assessing locations suitable for the filming of a documentary.

International Activities

The AONC has continued to be involved in a number of international activities, which provide the AONC with access to data sets, covering our area of interest, which are held by other countries or developed as a result of international and regional scientific programs. A description of each of these activities follows:

Integrated Global Ocean Services System (IGOSS)

AONC has continued to contribute to the IGOS system. The Australian Specialised Oceanographic Centre has undergone some development. A semi-automated quality control system has now been implemented, and two data distribution products and a statistical analysis of data flow for monitoring purposes, are now generated on a regular basis. Data distribution charts are mailed to 10 national and international organisations.

Global Temperature/Salinity Pilot Project (GTSP)

A seminar on GTSP was held at the United Nations headquarters in New York (15-16 January, 1990). A detailed briefing on this project, initiated by Australia, Canada and the USA, was given to 45 representatives from 14 countries and other international organisations including the International Council for the Exploration of the Sea, the United Nations Ocean Affairs and Law of the Sea and the World Meteorological Organisation.

At the seminar both the USSR and France indicated their intention to become active participants, and they are expected to make major contributions to the development and operation of GTSP. France, through its involvement in the Tropical Ocean/Global Atmosphere (TOGA) program, will provide both large data sets and assistance in the quality control and management of data. The USSR hold important time series data sets which will be of considerable value to the GTSP Data Base.

International Oceanographic Data and Information Exchange (IODE)

In January, 1990, the RAN was represented at the Thirteenth Session of the Technical Committee on IODE. The meeting was held in the United Nations headquarters in New York from 17 to 24 January.

Some 61 countries belong to the IODE program and the majority of these attended the Technical Committee Meeting, together with representatives from other major scientific agencies and research programs.

Japan Oceanographic Data Centre (JODC)

The Department of Industry, Technology and Commerce (DITAC) have developed a Science and Technology Agreement with Japan. Under this agreement, there is a category covering oceanographic data and information exchange. The AODC is the Australian contact for this category. Two initiatives have occurred in 1989/90 under the auspices of this agreement.

In March, 1990, a scientist from the Japan Oceanographic Data Centre (JODC) arrived in Australia to work in the AODC, for twelve months, on a data management project. This project involves the development of a Personal Computer based oceanographic data quality control system, which offers considerable benefit, to both Australia and Japan.

In April, 1990, the Head of the AODC visited the JODC, in Tokyo, for seven days. This visit, sponsored by DITAC, under the Science and Technology Agreement, has assisted in significantly increasing the level of cooperation between the Australian and Japanese data centres. To date some Japanese data have already been acquired by AODC as a direct result of the visit, and a Data Management Project, which will benefit both Australia and Japan as well as other countries in the South East Asia region, is currently being examined.

Other Projects

The AODC has held discussions with the CSIRO's Division of Oceanography regarding data management aspects of the Australian contribution to the World Climate Research Programme's World Ocean Circulation Experiment (WOCE). The discussions concern the establishment of a WOCE Upper Ocean Thermal Data Assembly Centre to quality control, archive and disseminate data from the Australian region, with particular emphasis on the Indian Ocean region. Involvement with this program will provide AODC with access to large, scientifically validated thermal data sets.

Facilities

With the implementation of HYDROCOMP, which is not anticipated to be completed before late 1991, the AODC will be able to actively seek additional data sources to increase existing data holdings. The ability to more effectively exchange data with the international marine science community, as a result of HYDROCOMP, will improve access to international data holdings maintained by other countries and held in the three World Data Centres (Oceanography).

NAVAL WEATHER AND OCEANOGRAPHY CENTRE

The Naval Weather Centre was retitled the 'Naval Weather and Oceanographic Centre' (NWOC) in early 1990, to better reflect its increased contribution to the oceanographic sphere of environmental predictions for Fleet units and the RAAF Maritime Patrol Group. In addition, in response to initiatives aimed at aligning Command and Control arrangements for the NWOC with Program Management and Budgeting, the NWOC became a lodger unit within HMAS ALBATROSS in February, 1990. Functional control of the NWOC, with the exception of the RAN School of Meteorology (RANSOM), is exercised by the Hydrographer RAN, through the Director of Oceanography and Meteorology (DOM), on behalf of the Maritime Commander Australia (MCAUST). Functional control of the RANSOM is exercised by the Commanding Officer HMAS ALBATROSS on behalf of the Commodore, Training (COMTRAIN). Related to the lodger unit initiative, the NWOC became a separate signal address (NWOC NOWRA) in June 1990.

During the year, NWOC's capabilities have been enhanced with the acquisition of the Naval Meteorological (NAVMET) computer system, which was opened by MCAUST in late May. the advent of NAVMET has minimised the labour intensive task of plotting surface synoptic charts and upper air charts by meteorological observers, and released them to undertake a more diverse role in the office.

This includes data retrieval, preparing vertical soundings of the atmosphere, monitoring, and, if necessary, correcting the Australia wide synop information as it is received by the NAVMET system.

Various application programs, including climate statistics, radar and radio propagation prediction, shipping forecast management, and data displays are being developed for use on NAVMET.

Manpower

Partly as a result of the NAVMET system, but more particularly as a result of internal efficiency measures, including the re-siting of Upper Air equipment within the NWOC, a reduction of two junior sailors billets is anticipated. However, this is offset by the requirement for an extra METOC officers' billet in order to man a 24 hour forecasting routine. A complement submission is in the process of being staffed.

Action is also being taken to co-locate the RAN Applied Oceanography Centre, presently situated in the Australian Joint Maritime Warfare Centre (AJMWC), with the NWOC.

Environmental Output

Response to a survey of user requirements for environmental services, which commenced during the last reporting period, was excellent, with the majority of units expressing satisfaction with the quality of information received. As a result of feedback, and in keeping with the policy of being responsive to user needs, the NWOC is proposing a trial of a reduced weather forecast format for Minor Fleet Units, thus reducing communications time. In addition, a six month trial of providing 24 hour forecasts, instead of the usual 12 hour period of validity, to Major Fleet Units which are not helo capable, is nearing completion.

The volume of signalled environmental information to users has decreased slightly, from about 16 500 in 1988/89 to 15 500 in 1989/90. However, as a significant amount of the output in the latter half of 1989 was for units from other Navies attending the Bi-Centennial celebrations, the current output represents a real increase in demand from ADF units.

Oceanography

Demand for Sonar Range Prediction forecasts (AUSRAPS) has doubled in the past 12 months, with more than 50 percent being taken by RAAF. Several requests were related to geographic areas outside the Australian station. The most noticeable area was the Southwest Approaches to England, where Exercise Fincastle was conducted in Late 1989. The Fleet Concentration Period conducted earlier this year in New Zealand waters, 'Exercise Kangaroo 89' and two TAMEXs have been supported with AUSRAPS forecasts for planning purposes, and updated with real-time information as it became available.

The use, in oceanographic terms, of the Man Computer Interactive Data Access System (MCIDAS), acquired last year as an aid for the oceanographic analysis of the Southwest Tasman Sea, has been, thus far, limited. A number of software modifications, to enable accurate satellite imagery showing sea surface temperature data to be accessed through MCIDAS, are in train.

Analysis of the Southeast Indian Ocean's Leeuwin Current has not yet been undertaken because of manpower and data limitations. However, once an onboard prediction system has been installed in Fleet Units, later in 1990, AUSRAPS production by the NWOC will virtually cease and analyses of the Leeuwin Current will commence. A plan for this task, which will identify various oceanographic parameters such as an optimal subsurface analysis depth, and data gathering requirements, is being developed.

A Minor Equipment Proposal (MEP), for replacement of drifting surface current buoys deployed during the Tropical Oceans and Global Atmosphere (TOGA) Experiment, is also being prepared.

Communications

The NAVMET and MCIDAS systems are to be registered as Defence Integrated Secure Communications Network (DISCON) users. The effect of this will be twofold:

- * using DISCON, NWOC shipping forecasts will be prepared using NAVMET and despatched directly to users via NAVCOMSTAR Canberra, rather than by the present circuitous communications route, thus saving time; and
- * a DISCON line will link the NWOC MCIDAS to its data source in Melbourne, thus providing substantial savings in telephone line rental costs.

Investigation has begun into providing near real time meteorological and oceanographic information, such as charts and satellite images, to Fleet units via a satellite facsimile link direct from NWOC.

RAN TRAINING PROGRAM

Royal Australian Navy School of Meteorology (RANSOM)

The primary role of RANSOM is to conduct meteorology training for specialist meteorological and other personnel in the ADF. Major courses include the Military METOC course for RAN graduates of the BOM's forecaster course, the basic Conversion courses, and the Advanced Meteorology course, which is a prerequisite for promotion to Petty Officer. Other training conducted includes courses for the Army's Parachute Training School (PTS), plus the RAN Long Navigation course, Small Ships Flight Commanders course, EXAC Phase 3, Foreign Officers EXAC as part of the Defence Co-operation Program (DCP), Basic Aircrew course, Petty Officer Aircrew, and Electronic Warfare Systems operators on the H8 748 Flight.

The major RANSOM throughput during the last 12 months has been two basic Meteorological Observers courses, one Advanced Meteorology course, one Upper Air Qualifying course and two Upper Air Conversion courses. Additional commitments include:

- the rewriting and updating of training notebooks for major courses; and
- the development of NAVMET training packages.

The Foreign Officers EXAC course, conducted in February, 1990, was tailored to the requirements of the individual nations represented. Students from the following countries attended:

- Cook Islands (4),
- Federated States of Micronesia (4),
- Marshall Islands (4),
- Papua New Guinea (2),
- The Philippines (2),
- Solomon Islands (3),
- Tonga (3), and
- Western Samoa (3).

DEVELOPMENT AND CORPORATE SERVICES

Manager: Director Co-ordination and Development

Sub-Component 215050

DEVELOPMENT AND CORPORATE SERVICES

Sub-Component 215050

The Development and Corporate Services sub-component provides the forward planning and co-ordination necessary to ensure the delivery of maritime geographic and environmental information under Navy Program Component 215000, for defence and national requirements. Military demand for such information is rapidly increasing as defence capability becomes dependent on it to support sophisticated systems processing for command, operations and weapons deployment. National requirements for hydrography are also being driven by international demand for integrated navigation information systems. These information requirements over the vast area of Australian maritime interest, place significant emphasis upon the technological capabilities for acquiring the necessary information and the systems technology necessary for processing and delivery.

The activities of the Branch in acquiring information involves considerable liaison and coordination with both national and international agencies in the conduct of operations, creation of standards and the monitoring and promotion of Australia's interest in the collection of maritime geographic and environmental information. The maritime information base acquired as a combination of direct survey, alternative sources and different technologies, needs a high level of forward planning, coordination and program monitoring to achieve the most cost effective solutions within economic constraints. Continuing emphasis is being placed on new cost recovery and commercialization activities to provide a return on investment for information collection, intellectual property and know-how.

Access to specialised personnel and computing systems tend to remain the most difficult areas to progress, both in terms of obtaining sufficient suitable resources and ensuring the most cost-effective solutions are in place. Development activities in hydrography and oceanography require access to a highly specialised and unique knowledge base and continuing emphasis has been placed throughout the year on the acquisition and development of specialist human resources. In systems acquisition, it is necessary to ensure that appropriate recognition is given to the external influences upon the Branch. This places a high degree of emphasis on matching systems requirements to those specialist areas of international activity which inevitably lie outside departmental systems guidelines. There continues to remain a considerable gap in the capability of industry to provide the computing systems suited to maritime geographic and environmental information without significant design input from within the Branch. This reinforces the need to align systems requirements to the specialist international areas, in order that the pool of expertise is effectively exploited.

HYDROGRAPHIC DEVELOPMENT

This element is responsible for raising new policy and equipment proposals relating to hydrographic surveying activities. No new policy initiatives have been raised in 1989/90, but there has been considerable activity in relation to equipment, as detailed below.

Survey Motor Launches (SML)

The four SML's constructed by Eglo Engineering of Adelaide, South Australia, have been commissioned and commenced survey operations. All four are now based in their home port of Cairns and will operate on the north coast of Australia and in the South West Pacific. Experience to date has proved the vessels to be highly capable platforms, ideally suited to the role of hydrographic survey.

Hydrographic Data Logging and Processing System (HYDLAPS)

The HYDLAPS project is approaching completion. All units of the Hydrographic Service are fitted with HYDLAPS, and survey operations are now almost exclusively conducted utilising HYDLAPS. The system is based on the Qubit TRAC V-CHART V configuration, utilising Hewlett Packard 9000 series computers. System performance, to date, has been very satisfactory.

Offshore Hydrographic Ships

A project to acquire a class of 65 metre ocean capable survey ships is under development. It is proposed to introduce the vessels into service in the period 1997 to 2000, as replacements for HMAS MORESBY, HMAS FLINDERS and HMAS COOK.

Tide Gauges and Current Meters

The project, for the supply of tide gauges and current meters to all units of the Hydrographic Service, has reached tender evaluation phase. The equipment is scheduled to be in service by March, 1991. A significant feature of the project is the provision of tidal information to all survey platforms in 'real time' via acoustic and radio telemetry. The feature will lead to considerably improved productivity, by reducing the time off survey task presently required for the establishment and maintenance of manned tidal observation camps.

Minor Projects

Other projects in various stages of development include:

- Survey Motor Boat replacement
- GPS NAVSTAR acquisition
- HP 85 replacement
- MRS III upgrade
- Sidescan Sonar replacement
- Deepwater Echosounder Recorder replacement
- Remotely Operated Vehicles

Laser Airborne Depth Sounder (LADS) Project Activities

Following the award of the \$40M contract to BHP Engineering Pty Ltd, in May 1989, all sub-systems of LADS have been subject to varying levels of design work. However, during the later part of 1989/90 manufacturing (including aircraft modification) has become the predominant activity by all sub-contractors. The LADS aircraft in its new livery is due in Adelaide for installation of LADS equipment in October, 1990. In addition, general preparation of software is well advanced and all computing hardware has been purchased. Overall, project progress is satisfactory.

Although not all sub-systems will meet the target manufacturing completion date, contractor trials should commence in early 1991, and total system acceptance into naval service is still planned for mid 1992.

A feature of the success of the LADS Project, to date, has been the co-location of almost all key management and design personnel (Commonwealth, Prime Contractor and Sub-Contractor) at a single site in Adelaide. This approach has enabled design reviews, the processing of modifications, and sub-system interface issues to be dealt with expeditiously and has minimised the risks for future integration tasks. In addition, a noticeable team spirit has developed across sub-system boundaries.

During 1989/90 two transition conferences have been held to bring together Contractor, Project, End User and Trials Authority. These conferences are intended to report on project progress to a wider audience than the project group, and to smooth the transition into naval service.

BRANCH DEVELOPMENT - PLANNING, POLICY, PROJECTS

This program has supported the implementation of policy, as directed through the Branch Executive and provides long term planning support for information management and cartographic services, including the impact of Program Management and Budgeting on the Hydrographic service. Australia's direct involvement in the work of The International Hydrographic Organization's development of various international standards, including those for Electronic Chart Display Information Systems (ECDIS), continued throughout the year. Additionally, Branch representation on the Australian ECDIS Users' Group has continued.

The HYDROCOMP project was awarded to GeoVision Australia Pty. Ltd., and development of the required software has commenced. Some project related hardware has been delivered.

Development of the Hydrographic Information System (HIS) has been slow. The current phase of acquisition, the Hydrographic Operations Information System (HOPI), which has been granted DESINE exemption, will proceed during the forthcoming Financial Year.

The following papers were published during the year:

Furness, R.A. "Hydrography - A World of Difference: Managing Hydrographic Information", Proceedings, Ausgraph 89, The Australasian Computer Graphics Association, Sydney, 10-14 July 1989.

Furness, R.A. and Hall, I.W. "Cartographic Production Systems for Nautical Charting Systems", International Hydrographic Review, LXVIII No. 1, January 1990.

Hall, I.W. and Furness, R.A. "The Australian Hydrographic Information System", International Hydrographic Review, LXVIII No. 1, January 1990.

Furness, R.A. "Marine Cartography: The Australian Scene, Perspectives From Within the RAN Hydrographic Service", Proceedings, ICA Marine Cartography Seminar, Darwin, April 1990.

Homes, G.M. "The Greenhouse Effect on Sea Level and Port Facilities", First National Technical Conference, Association of Australian Port and Marine Authorities, 21-23 August, 1989, Mackay, Qld.

Homes, G.M. "Global Climatic Change and the Role of the Permanent Committee on Tides and Mean Sea Level", 9th Australian Conference on Coastal and Ocean Engineering, The Institution of Engineers, Australia, 4-9 December, 1989, Adelaide, SA.

Compton, J.S. "Tides and Mean Sea Level", 32nd Australian Surveyors Congress, The Institution of Surveyors, Australia, 2-5 April 1990, Canberra, ACT.

NATIONAL AND INTERNATIONAL AFFAIRS

National Affairs

The Hydrographic Service continues to convene the Permanent Committee on Tides and Mean Sea Level and to chair the Working Committee for the National Tidal Facility. The Service provides the secretariat support for both committees.

Technical consultancy was provided to the AMSAT Project Office by Mr. G.M.Homes, for the project design phase of the SW Pacific Climate Change and Sea Level Monitoring Project for AIDAB. The consultancy included site visits to the Solomon Islands and Papua New Guinea.

The first AAPMA Technical Conference was held in Mackay, 21 - 24 August, 1989. Work commenced on the accreditation and registration of hydrographic surveyors and standards for hydrographic surveys in Australian ports. Standards were based upon IHO guidelines, and when ratified by the AAPMA Council they will facilitate the process of specifying and evaluating tenders for hydrographic port works by commercial contractors.

Visits

The Hydrographic Office, Sydney was visited during the year by VADM M.W. Hudson AC RAN, Chief of Naval Staff. Other notable visitors were RADM I.D.G. MacDougall RAN, Maritime Commander Australia and RADM J.A.L. Myres RN, Hydrographer, Royal Navy and Hydrographer, RAN from 1982-1985.

Sydney staff made visits to the Canberra Office and visited many collegiate organisations. The Branch was represented by Mr. K.G. Burrows (Director, Co-ordination and Development) at the 5th Australian Cartographic Conference which was held in Darwin during April/May 1990.

International Affairs

This function primarily involves participation in the activities of the International Hydrographic Organisation (IHO) and the Intergovernmental Oceanographic Commission (IOC). Activities in other forums involving defence and national civilian agencies are also part of this function. Throughout the year activity was focused upon decision making on technical and professional issues affecting the operation and level of performance of the Service. The activities involved the establishment of regulations, standards, levels of competency, participation in working groups and the fostering of regional coordination. The processes are effected by the production of discussion papers, correspondence, attendance at meetings, participation in working groups and research into professional issues governing international and national arrangements. Significant activities included:

- Standards for Hydrographic Surveying
- Standards of Competency for Nautical Cartography
- IHO Committee on the Electronic Chart (COE)
- IHO Committee for the Exchange of Digital Data
- Chair of the IHO Working Group on the Quality of Data
- IHO Committee for Chart Standardisation
- IHO Regional Coordinator for Area L International Charting
- Proposal for an Antarctic Regional Charting Commission
- Oceanographic Data Exchange Initiatives
- IOC Regional Committee for Western Pacific (Westpac)

The Hydrographer represented Australia's hydrographic interests at the Five-Nations Mapping and Charting Conference which was held during the year in Hawaii. In addition, he visited New Zealand, Solomon Islands and Vanuatu for Hydrographer-to-Hydrographer discussions on regional aspects of the charting program. Hydrographic ties between these countries benefitted considerably from these visits, as regional charting is marked by mutual co-operation between each country's agencies.

Australia continues to act as co-ordinator for the International Hydrographic Organisation charting initiative for Area Lima (Southern Indian and Pacific Oceans, including Southern Ocean). At 30 June, 1990 the third draft for the 1:500 000 scale international charting series is about to be despatched to the relevant nations.

Sydney staff made a number of overseas visits. Mr. R.A. Furness (Planning and Resources Co-ordinator), Hydrographic Office, visited Tokyo during November, 1989 to attend the International Hydrographic Organisation's (IHO) Seminar on Electronic Charting and the Meetings of the IHO Committees on Electronic Chart Display Information Systems (COE) and Exchange of Digital Data (CEDD), of which Australia is a member. Australia has taken responsibility for chairing the Working

Group on Data Quality, which is convened by our Member of the COE, Mr. K.G. Burrows, Director, Co-ordination and Development.

A senior member of the chart compilation staff, Mr. G. Jones, spent three weeks at the Solomon Islands Hydrographic Unit, for discussions on chart compilation procedures.

Mr. Ben Searle (Head, Science and Oceanography) and Mr. Garry Hopwood (Head, Computing Services) attended the second meeting of the organising committee of the Global Temperature and Salinity Pilot Project (GTSPP) held in Ottawa, Canada in July, 1989. GTSPP aims to develop a global data base of high resolution, scientifically assessed ocean temperature and salinity data in support of major world research programs, such as the World Ocean Circulation Experiment (WOCE) and various regional and national programs. As a result of this meeting the USSR and France became active participants in GTSPP adding to both the data quantities and expertise.

Mr. Searle attended the Thirteenth Session of the Intergovernmental Oceanographic Commission (IOC), International Oceanographic Data and Information Exchange (IODE) Working Committee meeting held in New York during January, 1990. This meeting discussed the exchange of non real time data between countries, including data formats, exchange mechanisms, quality control problems and support of international programs. Australia continues to be an important contributor to IODE.

Mr. Searle also visited the Japan Oceanographic Data Centre (JODC) for seven days in May, 1990, under the auspices of the Australia-Japan Science and Technology Exchange Agreement, sponsored by the Department of Industry, Technology and Commerce (DITAC), under the topic area of Oceanographic Data and Information Exchange. Mr. Searle held discussions with JODC covering a wide range of data management topics, particularly relating to the Western Pacific region. A cooperative data management project was discussed, and oceanographic data sets exchanged.

LCDR D.C. Holliday (Head, Operations and Surveying) and Mr. M.A. Bulger (Head, Navigation Services) visited Port Moresby during February, 1990 where they reviewed the on-going survey and charting programs for Papua New Guinea waters. Liaison with the Papua New Guinea Hydrographer was carried out in relation to future survey activity, and lines of communication were strengthened with the Papua New Guinea authorities.

Tidal Officer, Mr. B. Pillich, represents the Hydrographer at Global Sea Level Observing System (GLOSS) conferences, and on the International Hydrographic Bureau Working Group on standards and tidal prediction programs.

COMPUTING SERVICES

This element provides specialised computer support for the design, development and maintenance of ADP systems for the Hydrographic Service. Progress on HIS implementation has been rather slow due to financial constraints. In addition, the associated lack of resources has impacted significantly upon the Section's efficiency, and training and recruitment programs.

Hardware supplied under the HYDROCOMP project has been used to prototype the design concepts and verify the project viability. It has also provided an archiving facility (optical disk) for the Autochart tape library, HMAS Cook data and AODC's oceanographic data. The existing HIS hardware has been utilised for the library, administration, tides, autochart, AODC and the shipboard environment support system, TESS.

HMAS COOK

Computing Services has set up a geographic database to index COOK's tape archive. This database will ensure that data can be supplied to outside interests in a more timely manner. At present the tape archive comprises 91 tapes, data retrieval is a slow and tedious operation. Exercising the media is also been a very labour intensive task. The tape archive will be transferred to optical disk to alleviate these difficulties.

Laser Airborne Depth Sounder (LADS)

Work commenced on software to supply LADS with tidal models. The software will allow staff from the tides section to select relevant tidal stations. From these it will create a tidal model which will be stored on high density tape. Trials are due in early 1991, by which time HHS will be able to supply tidal and sounding data, and receive LADS sounding data, for display and processing.

Integrated Global Services System (IGOSS)

Enhancements have been made to the Specialized Oceanographic Centre (SOC) quality control software to enable statistics to be produced on the number of observations reaching the office. These statistics are required by all SR's under IGOS.

Library Database Management System

A library database management system has been developed. It is currently being used to manage the Hydrographic Office's library, including the AODC's library. In the future, the program will manage both AUTOCHARTS chart archive and registry's files and correspondence.

HYDROCOMP

In parallel with the GeoVision development, Computing Services has developed an in-house prototype. Although it lacks the functionality of HYDROCOMP, it is proving useful in supplying outside agencies with data and as a training tool.

Software to quality control incoming data is not part of HYDROCOMP, therefore, it will need to be developed by Computing Services. This will not be a trivial task, as there are no universal guidelines as to which checks should be made on the data. In the case of some low quality data, the operator may have to make the final quality control decision.

Computing services has developed a tidal database which will ultimately form part of HYDROCOMP. Future development of the database will primarily be concerned with the interfacing of existing programs and data entry. When complete this database will facilitate all aspects of the tidal section including:

- Survey Support,
- Cartographic Support, and
- Production of ANTT.

Tactical Environmental Support System (TESS)

The Tactical Environmental Support System (TESS) aims to provide a wide range of functions to support maritime units, and associated support agencies of the Australian Defence Forces (ADF). TESS will incorporate sophisticated environmental models and large databases of environmental and operational parameters.

Project development involves staff from the Australian Oceanographic Data Centre (AODC), the Applied Oceanographic Centre, DSTO Laboratories, Maritime Command Centre and Warfare Directorates, and Computing Services, Hydrographic Service.

The first stage of the project is to provide a basic, easy to operate system. TESS 1.0 should be operational by late 1990.

Hydrographic Information System (HIS)

Acceptance testing of HIS was completed during August, 1989, and the system was formally accepted into the Branch in September, 1989. Project definition and development is continuing, but system implementation is severely hampered by lack of funds to enable upgrade of functional software onto a current and more powerful hardware.

Work in progress on the HIS includes: the final development and documentation phase of the Chart Management Database, entry of existing manuscript survey indexes and the testing of the Survey Management Database scheme, categorisation of survey data rendered in terms of initial quality assessment, completion of software developed to transform survey data between spheroids (in particular, data gathered by HYDLAPS), and the definition of management procedures in the handling of digital sounding data. The impact of the system on management of information will not be felt immediately, but rather, will coincide with the growth of the database.

The commencement of the next phase of the HIS project will be dependent upon the availability of appropriate funding. When funding is allocated, HIS will be capable of operating on a more efficient and robust hardware platform, thereby allowing an initial implementation phase to be started. This phase will include the concentrated input of survey and chart indexes, and the installation of an HIS system in the Canberra Office, for the entry of bathymetric data.

Autochart

The Hydrographer's Automated Charting System - AUTOCHART - has undergone alterations during the year. Three Tektronix 4115B graphics terminals have been added to complete our complement of six interactive graphics workstations. A system reconfiguration was performed to incorporate acquired equipment in an effort to prolong the effective life of the system. Main changes in the reconfiguration were:

- decommissioning of 50mb disk drives and their replacement with 120mb units, thus significantly increasing chart storage capacity;
- implementation of a fourth CPU allowing for three data capture sub-systems driving two workstations each, substantially increasing response times; and
- linking of all sub-systems via a common disk drive, thereby, allowing disk-to-disk transfers.

Software development was on-going during the year. Several programs were modified or re-written to create a more efficient production tool.

It is expected that the Digital Tape Library will be transferred to optical disk in the near future. This will alleviate the requirement for bi-annual tape exercising routines, and other problems associated with magnetic tape media storage.

CORPORATE SERVICES

Considerable workload has been undertaken in this area throughout the year, particularly with the introduction of PMB. Major activity has occurred in the following areas:

Accommodation

Additional rental property has been acquired in North Sydney to accommodate staffing requirements following the rationalisation of activities under PM&B and increased emphasis on the oceanographic function and Branch development. Long term planning for a single facility to house all shore-based Maritime Geographic and Environmental Support facilities continued throughout the year with facilities planning and accommodation design milestones being achieved.

Program Management & Budgeting

The Branch Program Management Statement for 1990/91 was produced and published during the year, identifying activities down to the program element level. Mechanisms to coordinate the budgeting, allocations and resource monitoring under PMB have been implemented during the year. They include a financial data-base and resource management system that will allow identification of all resource costs down to the element level for evaluation of performance against program.

Staffing

The Branch human resource plan has been progressed throughout the year, in line with the introduction of PMB and deficiencies in structure arising from consolidation of resources after the 1988 Establishment Review and directions endorsed in the DDC's considerations on hydrography and oceanography. The draft plan is now being reviewed for publishing next year.

Commercialisation

There has been a continuation of demand from the commercial sector for the utilisation of H&N chart products in formats aligned to industry development of the electronic chart capability. This has involved consideration of the legal consequences and the effect of the emerging international position on the use of charting information in integrated navigation systems, currently under consideration of a joint working group of the International Hydrographic Organisation and the International Maritime Organisation. Throughout the year discussions have taken place between Defence and the Commonwealth Solicitor. The foundations for arrangements has been formulated to ensure a measure of return for the use of Commonwealth intellectual property and the establishment of appropriate monitoring procedures, commensurate with the use of Commonwealth information for navigation in line with international arrangements for maritime safety. Arrangement to gain reward for Commonwealth intellectual know-how in computing systems development were also implemented into contractual processes commenced during the year, indications are considered promising.

APPENDIX 1

SURVEYS UNDERTAKEN JULY 1989-JUNE 1990

Ship/Unit	Commanding Officer	Areas
HMAS MORESBY	CMDR R.J. WILLIS RAN CMDR L.G. GEE RAN (From 19 Jan 90)	HI 133 Cape Wessel to Elcho Is HI 152 Carnac 240 LADS Trial area HI 154 Defence HI 155 Survey S.W. Coast HI 157 Cape Wessel to Cape Stewart
HMAS FLINDERS	LCDR J.W. PATERSON RAN	HI 132 Supp 2 Great N.E. Channel HI 133 Woodlark Is West HI 148 Flinders Reef to Willis Islets
HMAS MERMAID	LCDR P.A. SPENCER RAN	HI 149 Supp 1 Bee Reef to Endeavour Reef HI 151 Lord Howe Is HI 158 Archer Point to Cape Kimberley
HMAS PALUMA	LCDR M.J. SINCLAIR RAN	HI 149 Supp 1 Bee Reef to Endeavour Reef HI 158 Archer Point to Cape Kimberley
HMAS SHEPPARTON	LCDR A.R. DENNISON RAN	HI 143 SA LADS Trial Area HI 164 Cairns MHI Trial Area HI 160 North Q'land LADS Trial Area
HMAS BENALLA	LEUT D.B. ERRINGTON RAN	Surveys in company with SHEPPARTON
HODSU	CDMR G.J. BOND RANEM/ LEUT D.B. ERRINGTON RAN LEUT K. SLADE RAN	HI 146 DCP Survey Solomon I HI 120 Supp 1 Approaches to Davis Anchorage

SURVEY EQUIPMENT IN SERVICE

Hydrographic Equipment

Echo Sounders	: Krupp Atlas Deso 20 ELAC 4721 Raytheon DE 719 AN/UQN 4
Sonars	: Simrad Searchlight Sonar Skipper 5113 Searchlight Sonar EG & G DCS3 Side Scan Sonar 239 Mk 3&4 ELAC LAZ 72 Side Scan Sonar
Electronic Positioning	: Cubic Western ARGON DM 54 Motorola Miniranger MRS 3 Motorola Falcon IV Magnavox 1105 Magnavox 1102
Tidal	: Bristol Elliott Tide Gauges ONO Current Meters Wesdata Tide Gauges
Boats	: 10m aluminum Survey Motor Boats (MORESBY-3, FLINDERS-1, School-1, HODSU-1) 10m timber Survey Motor Boat (School-1)
Data Logging and Processing	: HYDLAPS Qubit Trac V Chart V Chart VM Qubit Trac IV Chart IV

Land Survey Equipment

Principal Land Surveying Equipment includes:

Theodolites	: Wild T2
Levels	: Wild/Nikon/Fuji Automatic levels
EDM	: Tellurometer MRA 7 Sokkisha Red 12 Wild Distomat
Georeceiver	: Magnavox 1502

APPENDIX 2

CHART PRODUCTION AND MAINTENANCE

	1987/88	1988/89	1989/90
New Chart Production			
New Charts Published	11	17	12
New Editions Published	12	8	5
New Charts/Diagrams for RAN use	23	18	15
Miscellaneous Charts	1	1	1
Chart Maintenance			
Modified Facsimiles of BA charts	0	2	0
Notice to Mariners block corrections	41	36	39
Revisions by reprinting	180	197	154
Revisions by screen printing	36	140	160
Miscellaneous Graphs	77	64	27
Chart Printing			
New charts	11	17	12
New Editions	12	8	5
Revised charts	180	197	154
Reprinted charts	165	153	96
Bathymetric charts	0	0	34
Facsimile reproductions	0	1	0
Modified reproductions	0	2	0
Charts for Fleet purposes	4	4	2
Miscellaneous charts	0	19	1

Chart printing by RA Survey Regiment Bendigo, Victoria; - 303 charts, 130 747 copies.

CHART SCHEME STATISTICS 30-6-90

Category Scale	Published Imperial	Published Metric	Total Published	Total Planned
1:150 000 Aus, PNG	29	55	84	199
1:300 000 Aus, PNG	36	25	61	101
1:1 000 000 Aus, PNG, Antarctica	6	3	9	34
1:500 000 and smaller Aus, PNG, Antarctica	2	1	3	18
Large scale 1:5 000 to 1:100 000				
Aus	20	91	111	198
PNG	27	2	29	40
Antarctica	1	2	3	4
Territories & Reefs	3	1	4	19
International Charts				
1:1 500 000	0	1	1	20
1:3 500 000	0	0	6	6
1:10 000 000	0	1	1	1
Recreational Charts PC (Pleasure Craft) series	2	5	7	12
Y (Yachting) series	1	3	4	4
RAN Fleet Series	19	12	31	40
Diagrams	17	3	20	40
Totals	163	211	374	736

DESCRIPTION OF NEW CHARTS PUBLISHED

Aus 311 - Calder Shoal to Meatiq Mirang
(published 27-7-89)

A 1:300 000 scale chart providing ocean access north east of Darwin across the Timor Sea to the eastern extremity of Timor (Indonesia). This chart includes data from the national bathymetric survey program of 1979-82, R.A.N. hydrographic surveys 1945-58, and information from ocean sounding sheets. Aus 311 depicts the extent of Troubadour Shoals and Margaret Harries Banks.

Aus 602 - Approaches to Davis Anchorage
(published 10-11-89)

A large scale chart, 1:12 500 scale, to replace a plan of the same locality formerly published on chart Aus 600 (1961). The new chart was specifically prepared to include the R.A.N. hydrographic survey, approaches to Davis, 1989.

Aus 318 - Pelican Island to Penguin Shoal
(published 17-11-89)

Ocean coverage to the north of the Kimberly Coast of Western Australia, between Joseph Bonaparte Gulf and Admiralty Gulf at scale 1:300 000. The chart includes data from R.A.N. hydrographic surveys 1978-87 and the national bathymetric survey of 1984. This chart replaces Aus 318 published 1969 of imperial unit measurement.

Aus 319 - Penguin Shoal to Browse Island
(published 27-10-89)

A 1:300 000 scale chart covering the Indian Ocean area between Holothuria Banks and Ashmore Reef. Includes R.A.N. hydrographic surveys 1958-87 and national bathymetric survey data 1979-82. This chart replaces Aus 319 published 1966 of imperial unit measurement.

Aus 320 - Browse Island to Adele Island including Bonaparte Archipelago
(published 22-12-89)

This chart (1:300 000 scale) adjoins Aus 319 above and covers the ocean area off the Western Australia Kimberley Coast, from Institute Islands southwest to Camden Sound and includes offshore Browse and Adele Islands. Ocean data is from R.A.N. hydrographic surveys 1948-87 and national bathymetric surveys 1982-83. Aus 320 replaces British Admiralty chart 1242 published 1954.

Aus 309 - Darwin to Penguin Shoal (Eastern Sheet)
(published 21-12-89)

A medium scale chart 1:300 000 to replace former chart of the same number published in 1966 of imperial unit measurement. This chart affords coverage of the Timor Sea from 128° E to Bathurst Island and the waters of Beagle Gulf approaching Darwin. Includes R.A.N. hydrographic surveys 1944-85 and national bathymetric survey data 1983.

Aus 248 - Port Clinton
(published 22-3-90)

A large scale chart, scale 1:25 000, depicting the waters of Port Clinton and South Arm to the south, also the approach waters adjoining the coast and Cape Clinton Peninsula from Cliff Point to Deicomyn Island. This chart replaces former chart Aus 248, a modified reproduction of former British Admiralty chart 1952 published 1849.

Aus 260 - Broad Sound Channel and Shoalwater Bay
(published 27-4-90)

A 1:75 000 scale chart covering the waters surrounding Townshend Island, the northern extent of Shoalwater Bay and the area of Broad Sound Channel. Navigation is restricted in certain areas owing to military exercises. Notification to this effect is stipulated on the chart.

Aus 301 - Booby Island to Archer River
(published 30-4-90)

This chart provides ocean coverage in the Gulf of Carpentaria from Endeavour Strait south to Albatross Bay (Weipa) and Watson River (Aurukun), at scale 1:300 000. The chart replaces Aus 301 of imperial unit measurement published 1969. Hydrographic surveys of this chart area were conducted by the R.A.N., 1970-84. Data from the national bathymetric survey 1975-76 is also included.

Aus 333 - Geraldton to Ledge Point
(published 30-5-90)

Aus 333 completes coverage in metric format of the south-western coastal region of Western Australia, at scale 1:300 000. It replaces Aus 333 of imperial unit measurement published 1972. Sounding detail is based on hydrographic surveys conducted by the R.A.N., 1972-82. Ocean coverage affords passage from Geelvink Channel south to latitude 31° 15'S.

Aus 148 - Kent Group
(published 23-5-90)

A large scale chart at scale 1:25 000 designed to provide safe anchorage in the bays adjoining Murray Pass, and access to the Kent Group of islands in Bass Strait. This chart replaces a former British Admiralty chart published 1886.

Aus 343 - Whidbey Isles to Cape Covedie
(published 29-6-90)

This 1:300 000 scale chart replaces British Admiralty chart 3359, published 1969. Aus 343 completes metric chart coverage of South Australian waters from Port Eyre and Thevenard south to Cape Carnot and the waters of Spencer Gulf. The charted area includes the waters adjoining the southern portion of Eyre Peninsula, Thistle Island north to Dangerous Reef and east to West Cape, southward across Investigator Strait and the waters surrounding the western portion of Kangaroo Island.

DESCRIPTION OF NEW EDITION CHARTS

Aus 832 - Cape Flattery to Barrow Point
(printed NE 20-10-89)

Revised to include R.A.N. hydrographic surveys 1987 and to include two plans of Cape Flattery wharf area and berthing facilities at scales 1:37 500 and 1:10 000

Aus 5060 - Australian Fishing Zone Limits & Australian Internal Waters
(printed NE 10-5-90)

Revised to include Australia's Territorial Sea Baselines and the Protected Fishing Zone (Torres Strait) agreed to by Australia and Papua New Guinea.

Aus 292 - Adolphus Channel to Prince of Wales Channel
(printed NE 29-6-90)

Revision of sounding datum to surveys in the area of Adolphus Channel based on revised figures for Lowest Astronomical Tide.

Aus 828 - Palm Isles to Brook Islands and Palm Passage
(printed NE 29-6-90)

General revision to include R.A.N. hydrographic surveys 1984-88 and data from the national bathymetric survey 1984. Topographic adjustment has been enhanced by reef positioning and delineation based on reef survey sheets supplied by the Great Barrier Reef Marine Park Authority.

Aus 5020 A & B - Australian Index of Nautical Charts and Publications
(printed NE Jan 1990)

Both these charts are updated annually to include limits of newly published charts, adjust information concerning charts withdrawn, amend lists of nautical publications and diagrams, and include details of newly appointed chart agents. New editions of the index are available for distribution in January each year.

CHARTS IN PRODUCTION (30th June 90)

NC - New Chart
NE - New Edition

CHART NO	CATEGORY	TITLE	STATE	
			SCALE	LOCALITY
Aus 732	NC	Buccaneer Archipelago to Collier Bay	1:150 000	WA
Aus 733	NC	Buccaneer Archipelago to King Sound	1:150 000	WA
Aus 323	NC	Adels I. to Lacepede I. inc. King Sound	1:300 000	WA
Aus 835	NE	Cape Weymouth to Cairncross Island	1:150 000	Q
Aus 112	NE	Approaches to Fremantle	1:37 500	WA
Aus 763	NC	Cape Le Grande to Cape Pasley	1:150 000	WA
Aus 235	NE	Approaches to Moreton Bay	1:75 000	Q
Aus 249	NE	Hay Point to Penrith Island	1:75 000	Q
Aus 200	NE	Port Jackson	1:20 000	NSW
Aus 236	NE	Moreton Bay	1:75 000	Q
Aus 762	NC	Rocky Island to Cape Le Grande	1:150 000	WA
Aus 388	NC	Karkar Island to Kairiru Island	1:300 000	PNG
Aus 384	NC	Cape Vogel to Cape Nelson	1:300 000	PNG
Aus 631	NC	Mary Anne Passage	1:50 000	WA
Aus 500	NC	Bramble Cay to Fly R. and Wabada I.	1:150 000	PNG
Aus 742	NC	Rosemary Island to Barrow Island	1:150 000	WA
Aus 743	NC	Barrow Island to Onslow	1:150 000	WA
Aus 523	NC	Nassau Bay to Finsch Harbour	1:150 000	PNG
Aus 654	Mod. Rep.	Plans in New Guinea (BA chart 2054)	various	PNG

APPENDIX 3

HYDROGRAPHIC INFORMATION RECEIVED DURING THE YEAR

Hydrographic Information Received from RAN Sources

HMAS FLINDERS	III 148	Willie Island to Flinders Reef
	III 132	Great North East Channel, Supplement 1&2
HMAS MORESBY	III 133	Arnhem Land East
	III 140	Cape Wessel to Eleks Island
	III 124	Mary Ann Point to Margaret Cove Thevenard Island to Barrow Island
HMAS PALUMA	III 112	Gulf of St Vincent and Jervis Bay
	III 142	Gulf of St Vincent
	III 149 (1)	Submarine safe bottoming area
	III 149 (2)	Cairns area wreck searches Bee Reef to Endeavour Reef
HMAS PALUMA & MERMAID	III 154	Archer Point to Cape Kimberley
HMAS MERMAID	III 151	Lord Howe Island
HOBSC	III 146	Eastern Solomon Islands
	III 120	Approaches to Davis Anchorages Darling Harbour - Cockle Bay Admiralty Steps - Garden Island Shark Island - Port Jackson
HMAS COOK	Seabeam & 'Gloria'	Albany
	GERCO	Sydney - Rabaul - Sydney
	GERCO	Townsville to Port Vila
HMAS HUNBURY		Monte Bella Islands
Hydrographic School		Brisbane Waters

Hydrographic Information Received from Non-Service Sources

Source	General Locality
NEW SOUTH WALES	
BMR Marine Geological Survey	Newcastle-Fraser Island
Dept Of Housing and Construction	Shark Island
Dept of Main Roads	Parramatta River
Dept of Transport	Port Jackson
Maritime Services Board	Lord Howe Island, Newcastle Harbour
Maritime Services Board- Hunter Ports Authority	Newcastle
Port Hedland Regional Maritime Historical Society	North West Australia
Public Works Dept	Dallara, Brisbane Water
River Quays	Mortlake
QUEENSLAND	
Aust Institute of Marine Science-AI'SLIG	Coral Sea, Bowling Green Bay
Cairns Port Authority	Cairns
Dept Harbours and Marine	Pomacentrae Passage, Dribble Island, Peel Island, Woody Point, Beachmere, Moreton Bay, North Stradbroke Island, Redcliffe, Mooloolaba, Abbot Point, Lucinda, Cairns, Weipa, Gladstone, Smith Creek, Whitsunday Island, Noosa, Cooktown Harbour, Snapper Creek, Kings Beach, Hook Island, Moreton Bay, Mooloolah River, Brisbane River Base, Bowen, Boyne River, Dunwich, Brisbane River, Deception Bay, Hamaga, Torres Strait, Thursday Island, Rosslyn Bay, Scarborough, South Stradbroke Island, Gold Coast, Wide Bay Bar, Southport, Victoria Point, Gladstone, Weipa, Lorim Point, Half Tide, South Gold Coast, Wellington Point, Mackay, Mourilyan Harbour, Redland Bay Channel, Hay Point
Dept of Transport	Southport, Scarborough, Mackay
GBRMPA	Great Barrier Reef
Gladstone Port	Gladstone
Kane Associates	Hay Point
Philip G Breene	North White Cliffs
Port of Brisbane	Hope Banks

Queensland Port Authority

Cairns

Telecom Australia

Queensland

NORTHERN TERRITORY

Darwin Port Authority

Darwin

SOUTH AUSTRALIA

MHP

Whyalla

Dept Marine and Harbours

Coffin Bay, Port Adelaide, Osborne, Port Adelaide

TASMANIA

Burnie Port Authority

Burnie

Dept of Main Roads

St Helens

Marine Board of Burnie

Burnie

Marine Board of Devonport

Mersey River, Port Uxbridge, Devonport

Port of Devonport Authority

Devonport, Fort Launceston, Burnie, Bell Bay

VICTORIA

Port of Melbourne Authority

Westernport, Portland, Port Phillip, Gippsland
Lakes, Portland Bay, Corner Inlet

WESTERN AUSTRALIA

Dampier Port Authority

Port Dampier

Dept Harbours and Marine

Chervil 4 to Airlie, Broome, Albany, Cape
Leeuwin, Cambridge Gulf, Port of Geraldton, Geraldton,
Shark Bay, Hopetoun, Cervantes, Cockburn Sound,
Bremer Bay, Exmouth, Warnbro, Bandy Creek

Dept of Main Roads

Fremantle, Cambridge Gulf, Albany, Swan
River, Esperance, Shark Bay, Geraldton, Falcon Bay,
Hopetoun

Exmouth Salt Int

Atle Island/South Pepper area

Fremantle Port Authority

Fremantle, Ross Head, Geomex Survey, Airlie
Island

Mesa Aust Ltd

North West Australia

WA Petroleum P/L

North West Australia

Westminco	Airlie Island/South Pepper area, North West Australia, Airlie Island, South Pepper Island
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OVERSEAS

Canada	Cambridge Bay
France	Loyalty Islands
Indonesia	Indonesia boundaries
Papua New Guinea	Port of Kimba, Lae, Misima Island, International Maritime Boundary, Papua New Guinea and Solomon Islands
Singapore	Muara
Solomon Islands	Malaita, New Georgia Group, Choiseul, Shorthand Islands, Florida Islands, Guadalcanal, Santa Isabel, Santa Cruz, Nendo, San Cristobal
U.S. Naval Office	North West Coast Australia

ANTARCTIC

ANARE	Macquarie Island, Prydz Bay, Davis
AUSLIG	Windmill Islands, Australian Antarctic Territory
BMR	Macquarie Island
NATMAP	McDonald Island, Heard Island, Newcombe Bay, Chick Island, Casey Station, Mawson, Windmill Islands, Holme Bay
Service Hydrographique de la Marine	Iles Kerguelen, Archipel de Pointe Geologie

Boating Charts

Australian Volunteer Coast Guard	Broken Bay, Brisbane Waters and Lower Hawkesbury
Dept of Harbours and Marine	Brisbane River, Moreton Bay, Pamicestone Passage, Jacobs Well, Wellington Point, Coochiemudlo Islands, Fitzroy Reef, Urangan-Bustard Head, Manddurah, Two Rocks, Busselton to Cape Clairault, Manddurah and environs, Peel Inlet and Harvey Estuary, Rottnest Island, Cervantes, Green Islands, Peaceful Bay, Wilson Inlet, Swan and Canning Rivers, Yanchep, Gullderton, Lancelin, Jurien, Ocean Reef to Cape Peron
Port of Melbourne Authority	Westernport
Tourist Organisation of NSW	Port Stephens and Myall Lakes

Topographic Maps

AUSLIG	38
Central Mapping Auth	2
DAS-NSW	1
DAS-NT	1
DAS-SA	2
DAS-WA	25
Dept Lands-TAS	1
Dept Lands-QLD	5
Dept Lands-WA	3
RASC	193
SUNMAP	12
TASMAP	25

Bathymetric Maps

Hydrographic Office
(Canberra) Kangaroo Island

Bathymetric Manuscript

Hydrographic Office
(Canberra) Bass Strait
Gulf of Carpentaria

Reports of Survey; Coral Sea no 1-1981, Arafura Sea no
3-1981

NATMAP Proserpine, Thursday Island

Satellite Imagery

AUSLIG Willis Islands, Lihou Reef, Malay and Abington
Reefs, Flinders Reefs, Kikori, Kerema, Lang Island,
Woodlark Island, Marshall Bennett Islands, Misima
Island, Normanby Island, Ashmore Reef

APPENDIX 4

DISTRIBUTION AND SUPPLIES

SUMMARY OF ANNUAL FIGURES 1989/90

	AUSTRALIAN	BRITISH	NEW ZEALAND	CANADIAN	TOTAL QTY	TOTAL VALUE
QTY ISSUE	28 743	17 421	1 252	158	47 574	
%	22	73	79	78	30	
QTY SOLD	101 928	6 456	340	45	108 769	
%	78	27	21	22	70	
TOTAL	130 671	23 877	1 592	203	156 343	
VALUE	\$1 054 973	\$430 427	\$14 705	\$1 340		\$1 531 445

VOLUME OF SALES AND DISTRIBUTION OF CHARTS AND ASSOCIATED PUBLICATIONS

		87.88	88.89	89.90	%
AUSTRALIAN	issued	29 166	32 208	28 743	22
	sold	116 360	118 526	101 928	78
BRITISH	issued	14 527	17 234	17 421	
	sold	9 779	6 204	6 456	
NEW ZEALAND	issued	1 458	2 524	1 252	
	sold	720	208	340	
CANADIAN	issued	16	44	158	
	sold	68	69	45	
TOTAL		172 094	177 017	156 343	

VALUE OF CHARTS AND ASSOCIATED PUBLICATIONS SOLD (exclusive of sales tax)

	1987/88	1988/89	1989/90
Australian	\$706 030	\$889 188	\$861 029
British Admiralty	\$104 328	\$96 484	\$103 482
New Zealand	\$3 131	\$2 577	\$3 975
Canadian	\$442	\$4	\$297
Total	\$813 931	\$988 702	\$968 783

RETAIL CHART PRICES (includes sales tax)

	1986/87	1987/88	1988/89	1989/90
Australian	\$10.60	\$11.10	\$14.38	\$14.38
British Admiralty	\$22.47	\$27.82	\$23.09	\$28.93
New Zealand	\$12.23	\$13.81	\$13.81	\$13.81
Canadian	\$7.26	\$7.26	\$7.26	\$7.26

APPENDIX 5

UNIFORMED AND CIVILIAN STAFFING LEVELS

Uniformed

Hydrographic Survey Specialists

The numbers of PNF hydrographic specialists in the Hydrographic Service on 30 June, 1990 were as follows (1989 figures in brackets):

Rank	Billets	Manning	
Commodore	1	1	(1)
Captain	1	1	(1)
Commander	4	4	(3)
Lieutenant Commander	12	11	(13)
Lieutenant	23	19	(13)
Sub Lieutenant	0	2	(0)
WOSR	1	1	(1)
CPOSR	5	5	(6)
POSR	12	11	(12)
LSSR	26	21	(16)
ABSR/SMNSR	71	41	(36)
Totals	156	117	102

The numbers of Reserves on active service were:

Commander	1
Lieutenant Commander	1
Lieutenant	2

Meteorological and Oceanographic Specialists

The numbers of Meteorological and Oceanographic (METOC) specialists on 30 June, 1990 were as follows (1989 figures in brackets):

Rank	Billets	Manning	
Commander	2	6	(5)
Lieutenant Commander	6	6	(6)
Lieutenant	5	4	(5)
Sub Lieutenant	0	0	(0)
WOM	1	1	(1)
CPOM	2	3	(2)
POM	4	6	(6)
LSM	15	16	(16)
ABM	24	23	(24)
SMNM	0	2	(0)
Totals	59	66	(65)

Civilian

The following civilian personnel were employed in the Hydrographic Service on 30 June, 1990:

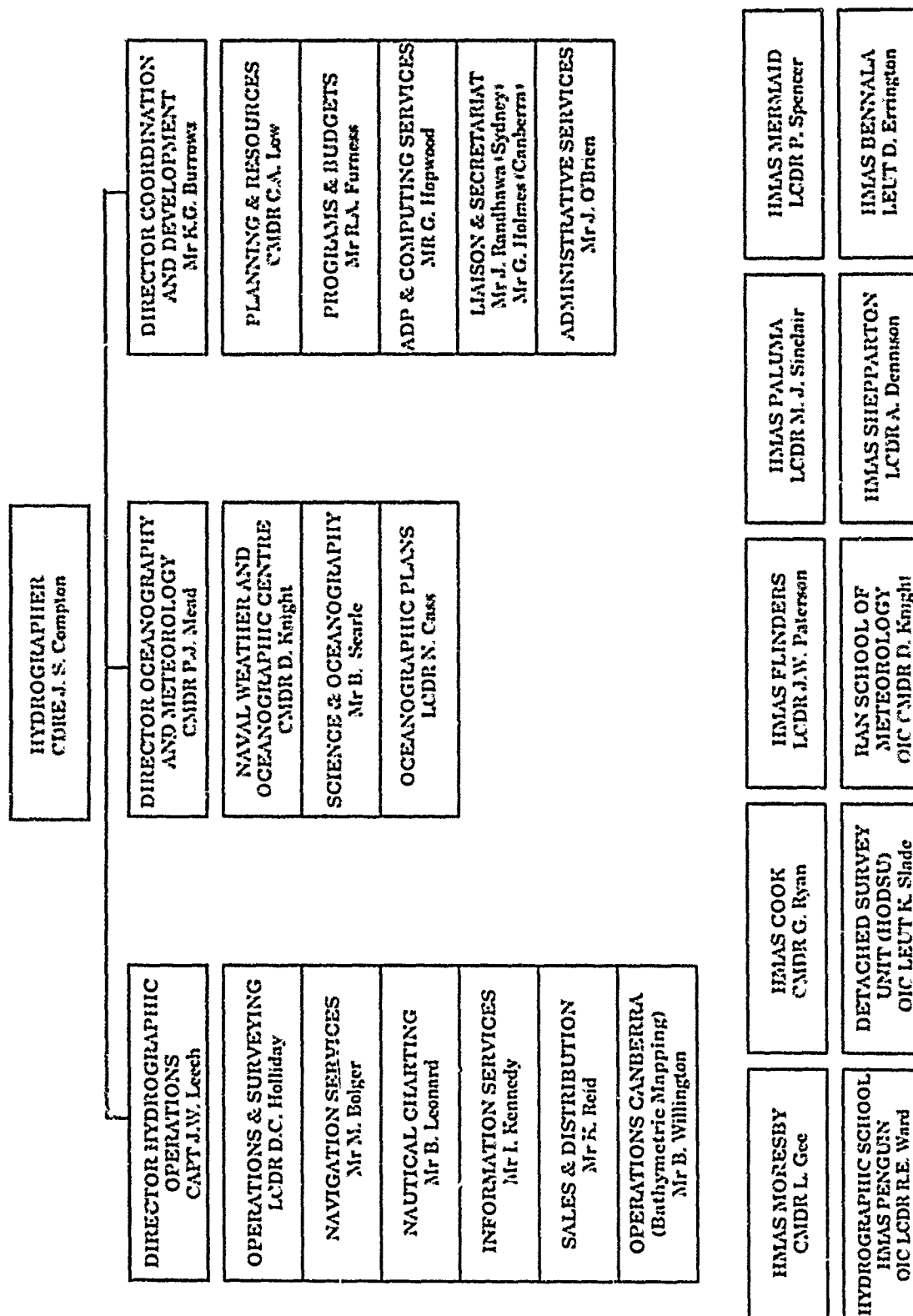
	Establishment	Average Staffing Level	Manning 30.6.90
Hydrographic Survey	2		2
Oceanographic Survey			
Navigation	101		72
Environmental Services	8		7
Development & Corporate Services	32		24
Totals	143	124	105

APPENDIX 6

HYDROGRAPHIC SERVICE KEY PERSONNEL DIRECTORY

Canberra		STD:00
Hydrographer	Commodore J S Compton AM RAN	252 7451
Staff Officer Hydrography	Lieutenant Commander R W Quarrill RAN	252 5471
Director Oceanography and Meteorology	Commander P J Mead RAN	252 6015
Oceanographic Staff Officer	Lieutenant Commander N F Cass RAN	021 925 4231
Director Operational Facilities	Mr B Willington	252 5169
Administrative Services Officer	Mr D Willcox	252 6592
Nowra		STD:044
Commander Naval Weather and Oceanographic Centre	Commander D J Knight RAN	21 1268
Sydney - Operations		STD: 02
Director Hydrographic Operations	Captain J W Leech RAN	925 4801
Head Operations and Surveying	Lieutenant Commander D C Holliday	925 4804
Quality Control Officer	Lieutenant Commander B J Kafer RAN	925 4808
OIC Detached Survey Unit	Lieutenant K Slade RAN	925 4894
Tidal Officer	Mr B Pillich	925 4872
Survey Equipment Officer	Warrant Officer K Bauer RAN	925 4812
Head Science and Oceanography	Mr B Searle	925 4230
Head Navigation Services	Mr M Bolger	925 4850

Sailing Directions Officer	Captain J J Doyle RANEM	925 4851
Head Nautical Charting	Mr B C Leonard	925 4870
Supervisor Cartographic Services	Mr B Rowland	925 4854
Supervisor Chart Production	Mr B Wagstaff	925 4832
Manager Information Services	Mr I Kennedy	925 4853
Manager Chart Distribution	Mr K Reid	925 4880
Sydney - Co-ordination and Development		STD: 02
Director Co-ordination and Development	Mr K Burrows	925 4201
Head Planning and Resources	Commander C A Low RAN	925 4235
Manager Program and Budgets	Mr R Furness	925 4203
Staff Officer Systems	Lieutenant Commander K McGregor RANEM	925 4208
Head Computing Services	Mr G Hopwood	925 4220
Administrative Services Officer	Mr J O'Brien	925 4218



HYDROGRAPHIC SERVICE RAN - KEY ADDRESSES

Addresses as of 30 June, 1990

SYDNEY

RAN Hydrographic Office
161 Walker Street
NORTH SYDNEY NSW 2059

P.O. Box 1332
NORTH SYDNEY NSW 2060

Switch: (02) 925 4600

Telex: AUSHYD AA 72669

Fax: (02) 925 4835

Signal: HYDRO SYD

CANBERRA

Office of the Hydrographer RAN
Unit 3Ge
Cameron Offices
Cnr Cameron Avenue and
Edmonds Place
BELCONNEN ACT 2616

Phone: (06) 252 7451

Fax: (06) 253 1683

Signal: HYDRO RAN

Operations Facilities Section
Unit 3Ge
Cameron Offices
Cnr Cameron Avenue and
Edmonds Place
BELCONNEN ACT 2616

Phone: (06) 252 5169

Fax: (06) 253 1683

Field Units

Naval Weather and Oceanographic
Centre
Naval Air Station
NOWRA NSW 2540
Phone: (044) 21 1269

HMAS MORESBY
c/o HMAS STIRLING
P.O. Box 228
ROCKINGHAM WA 6168
Phone: (09) 627 0470

HMA SHIPS FLINDERS,
PALUMA MERMAID,
SHEPPARTON, BENALLA
c/o HMAS CAIRNS
Draper Street
CAIRNS QLD 4870
Phone: (070) 50 3311

HMAS COOK
c/o Warships
SYDNEY NSW 2890
Phone: (02) 359 9111

Training Schools

RAN Hydrographic School
HMAS PENGUIN
c/o Naval Post Office
BALMORAL NSW 2890
Phone: (02) 960 0264

RAN School of Meteorology
Naval Air Station
NOWRA NSW 2540
Phone: (044) 21 1269

ILLUSTRATIONS

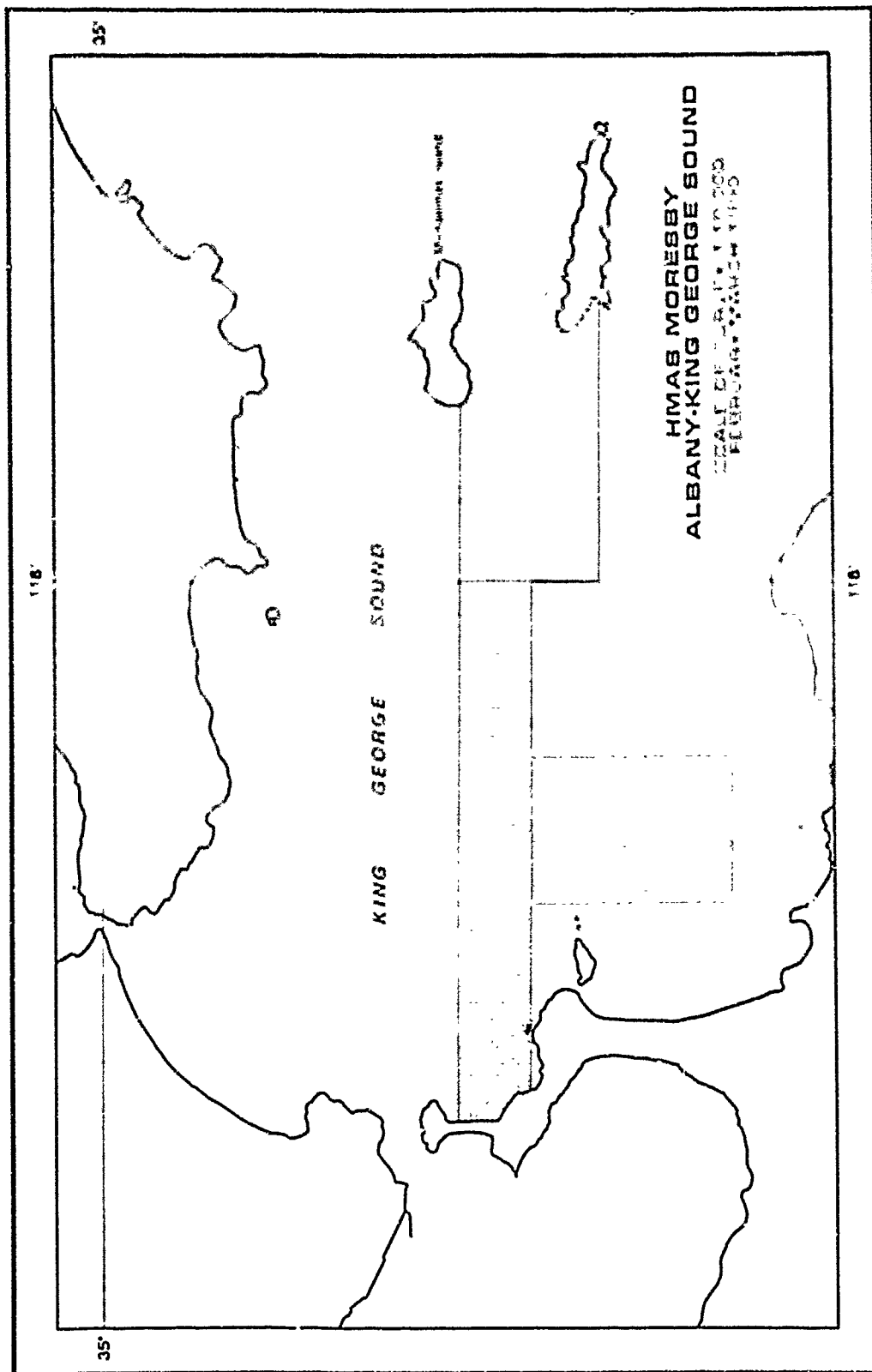


FIG. 1

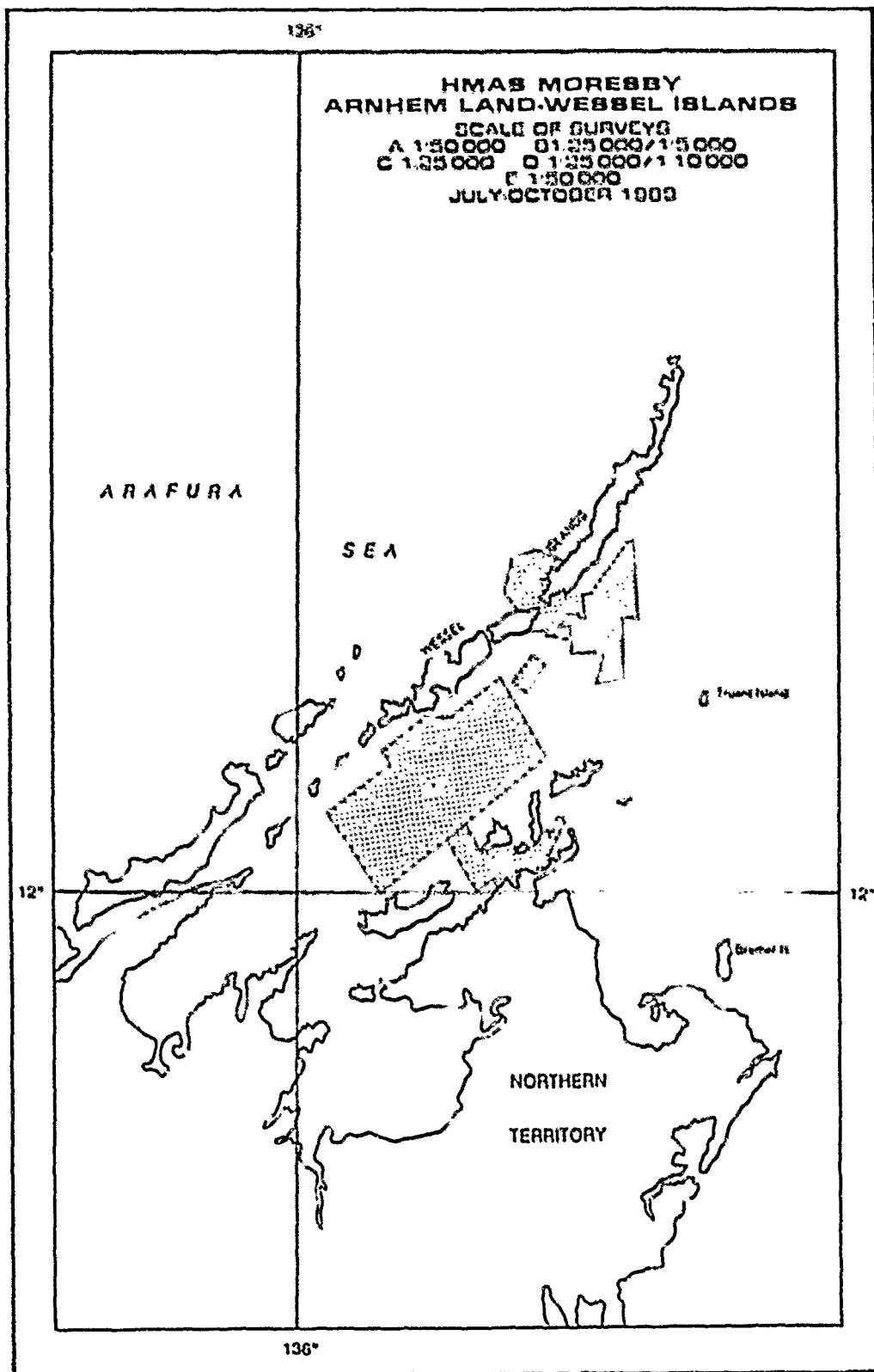


FIG. 2

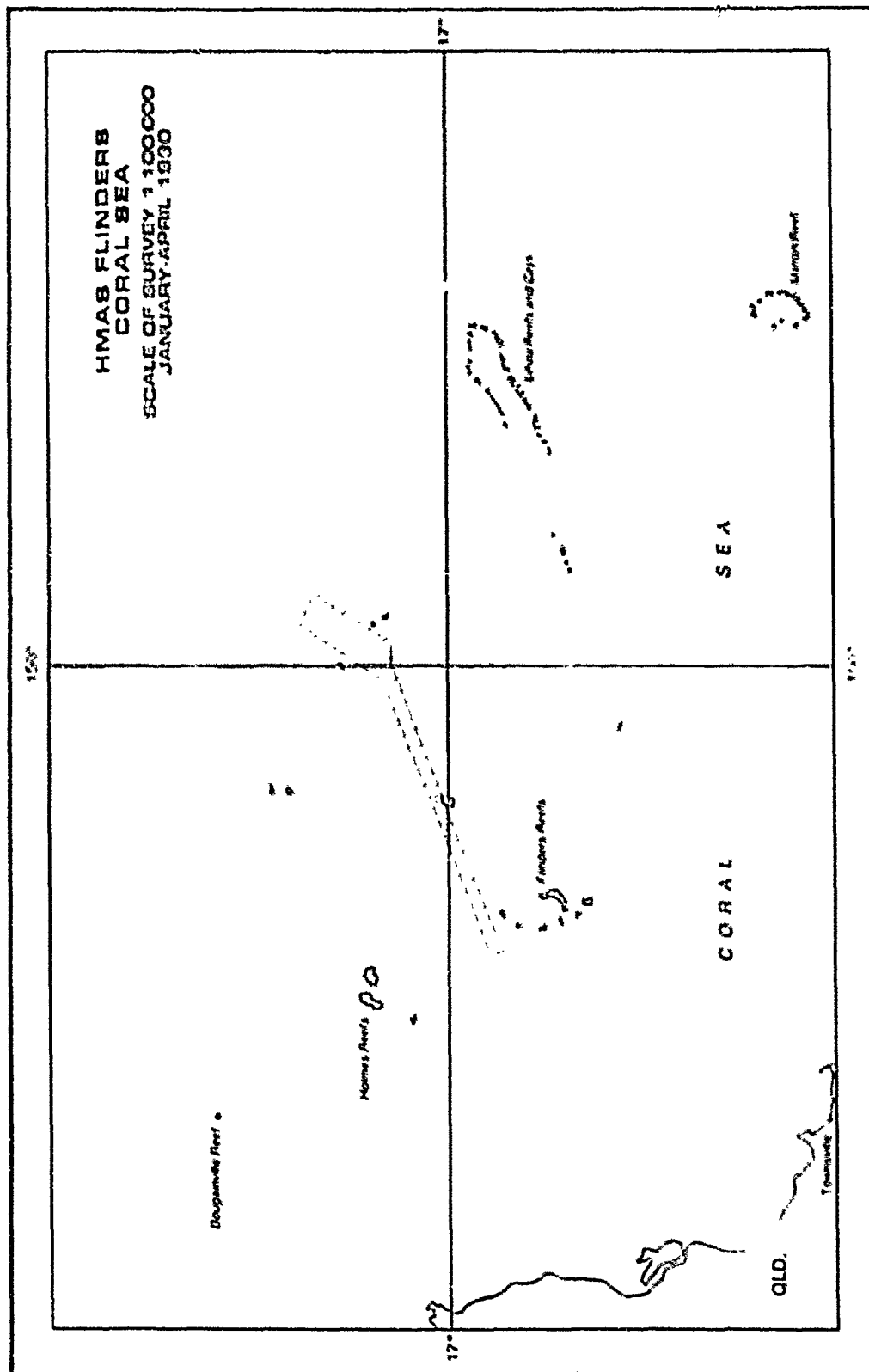


FIG. 3

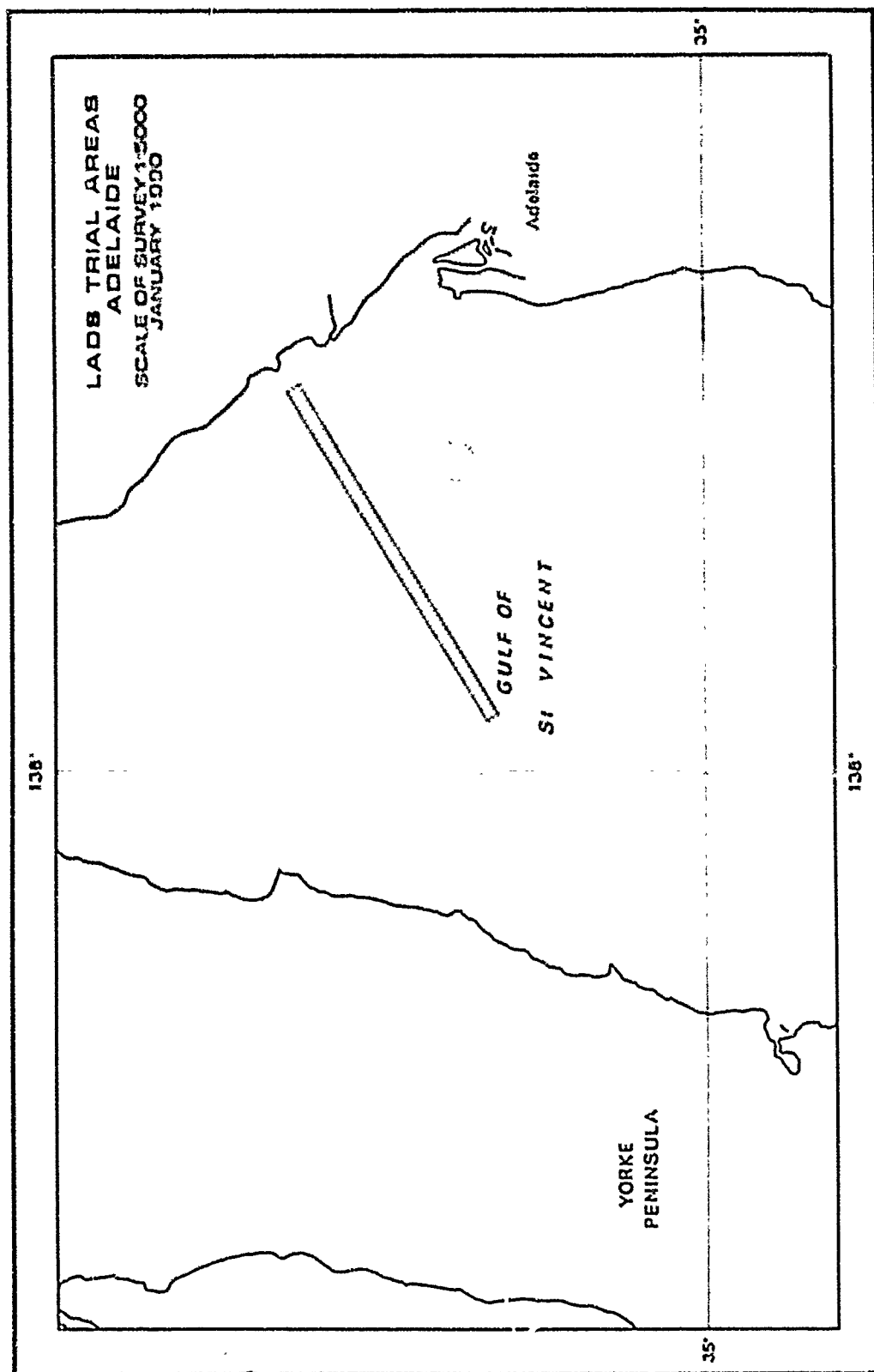


FIG. 4

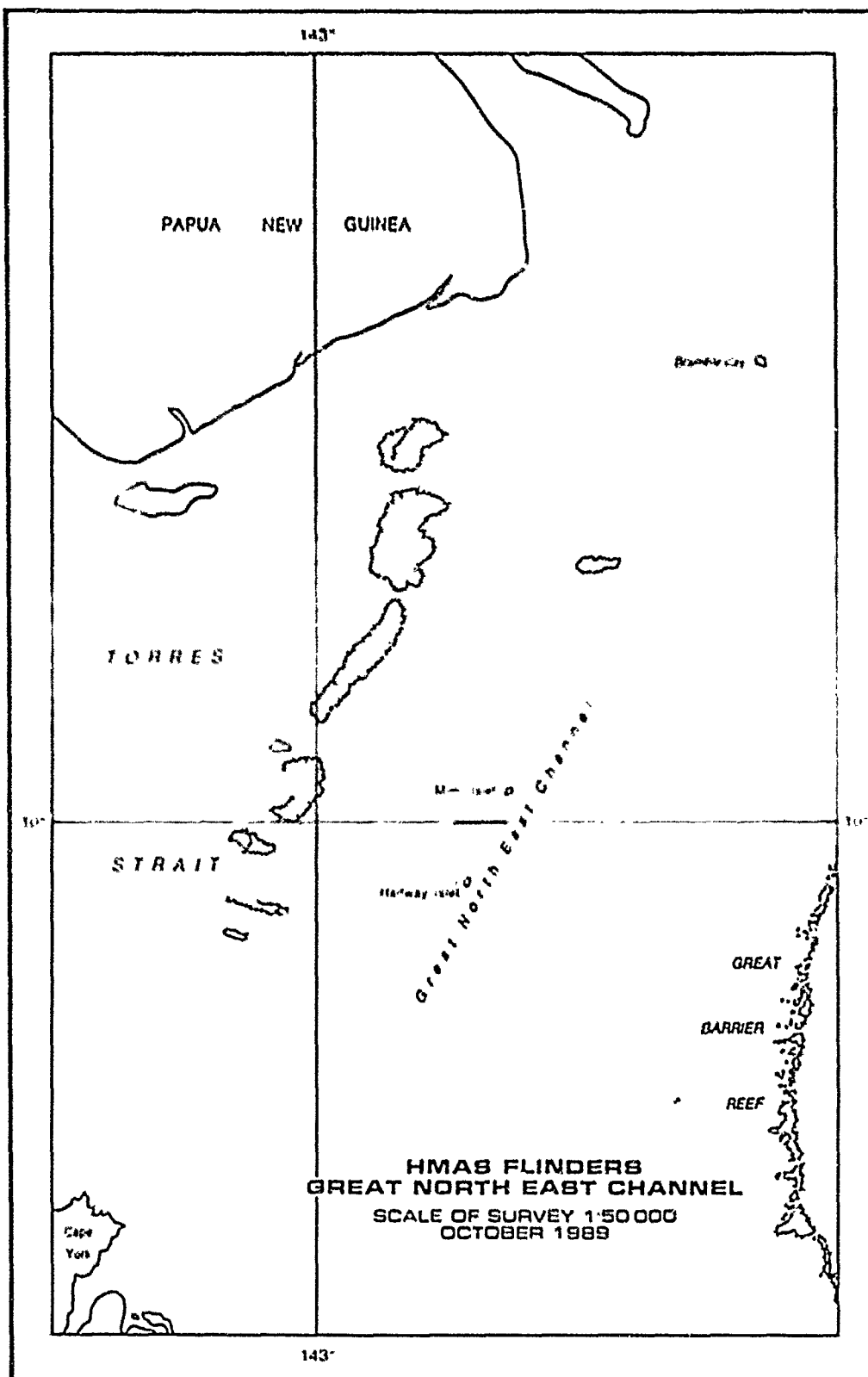


FIG. 5

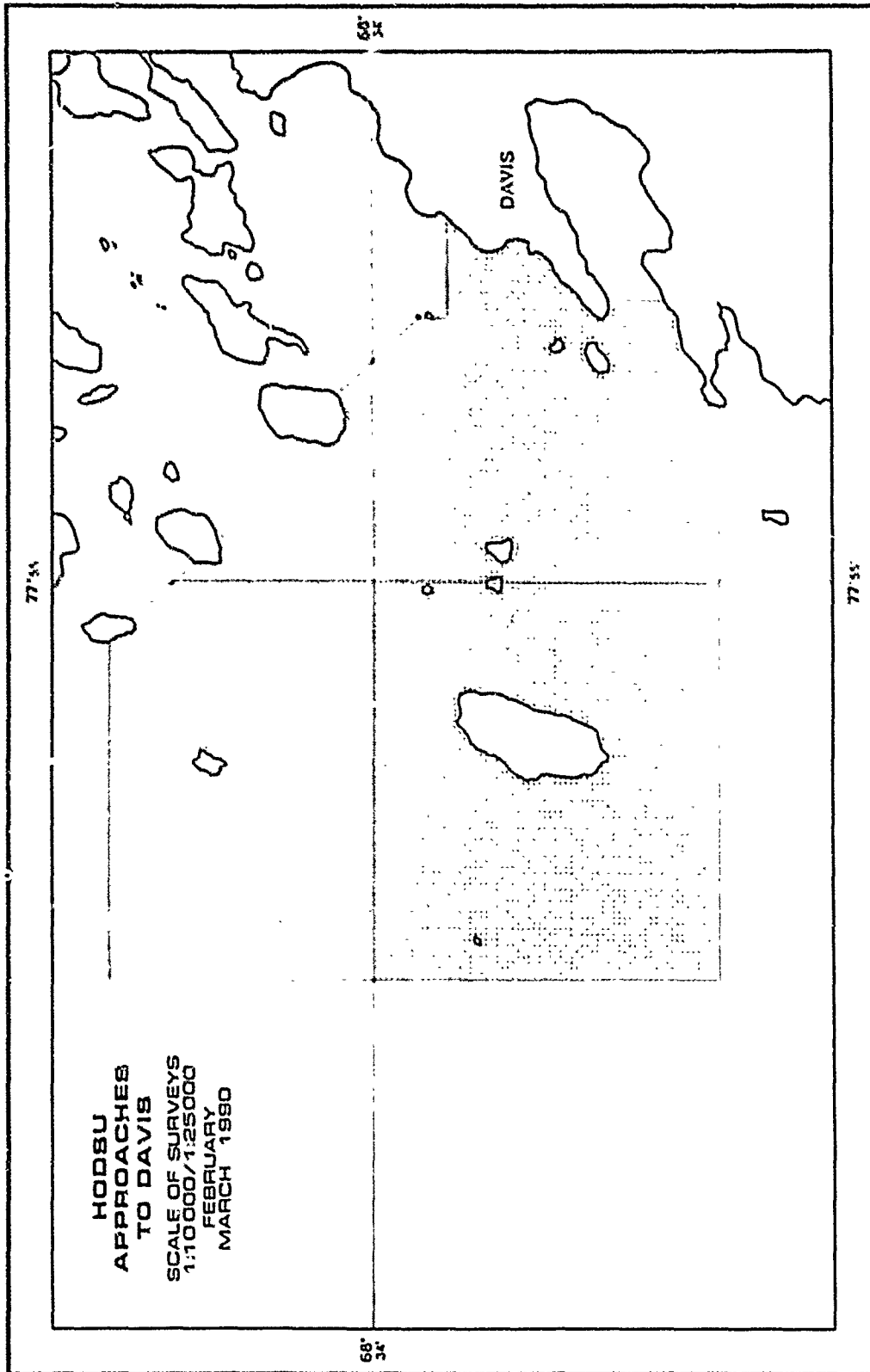


FIG. 6

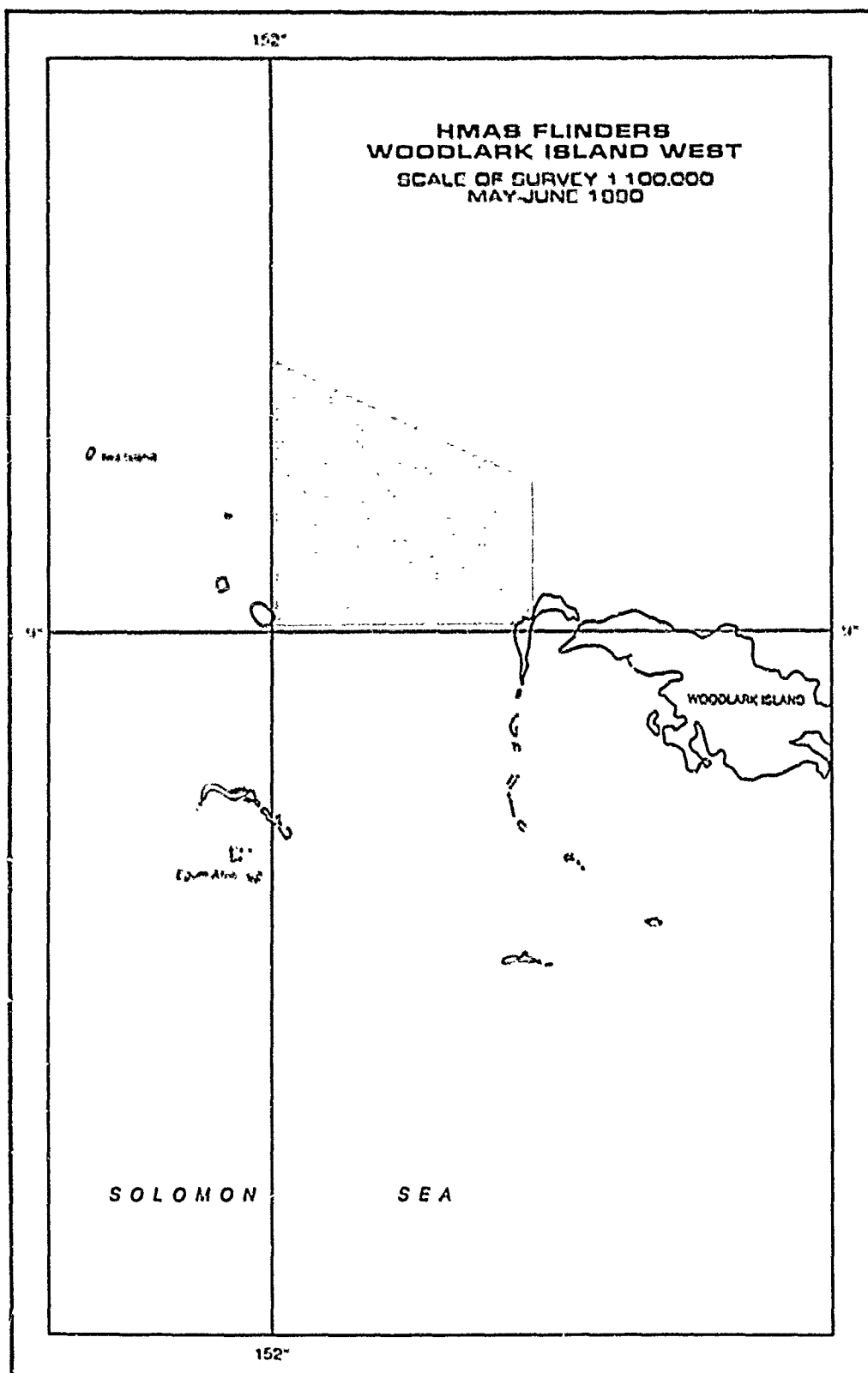


FIG. 7

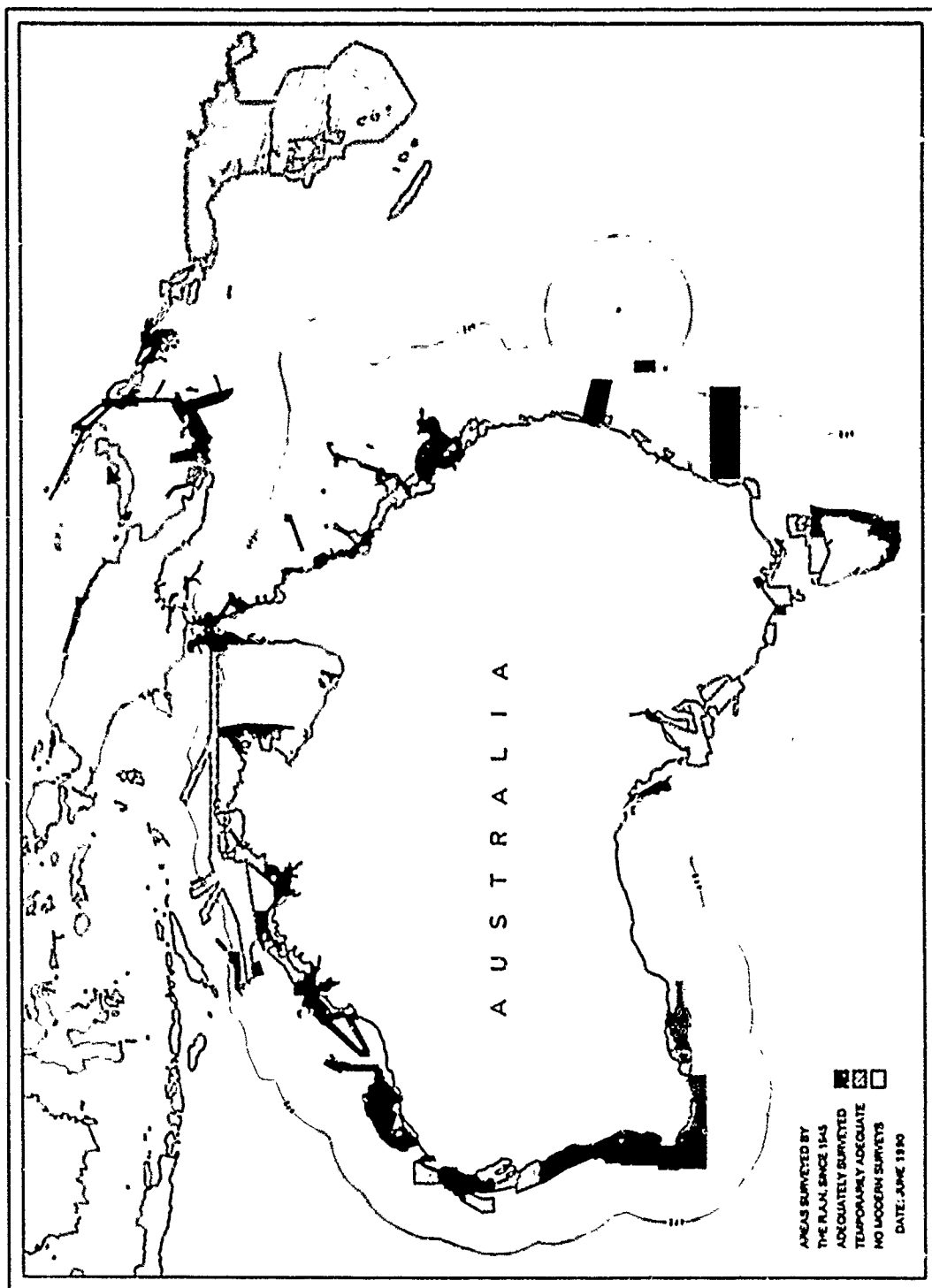


FIG. 8



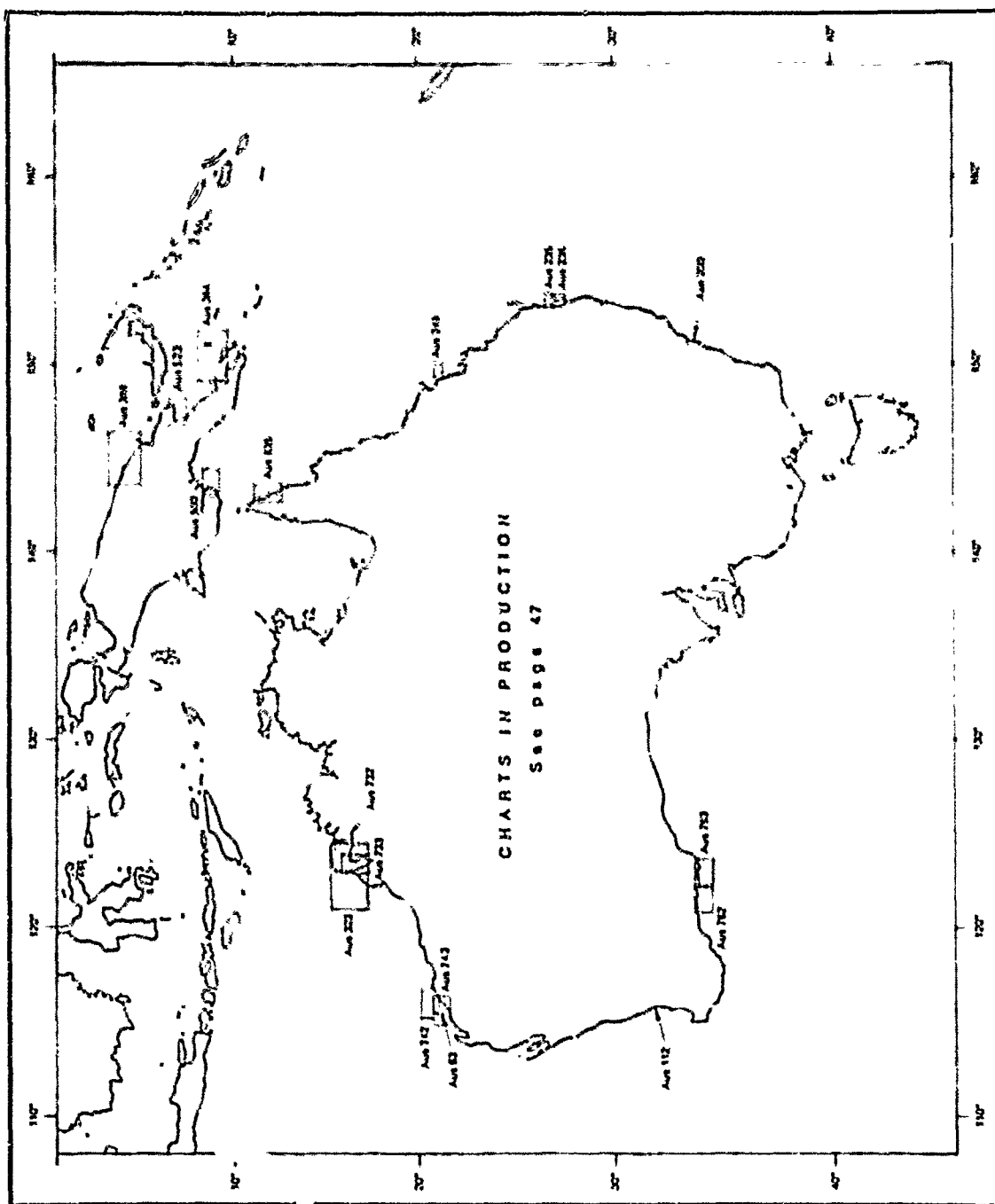


FIG. 10

1:250 000 BATHYMETRIC
MAPPING PROGRAM

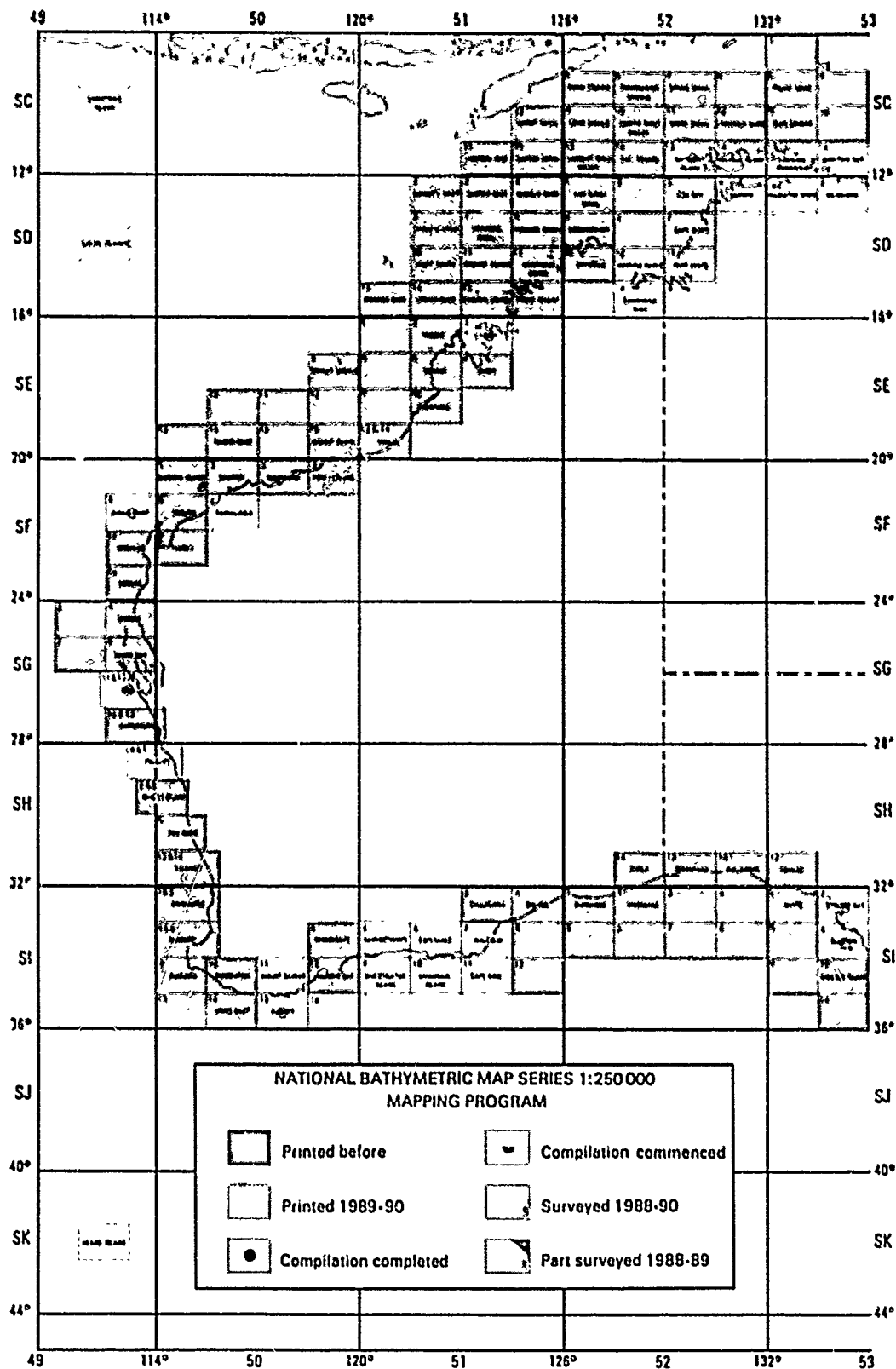


FIG. 11 A

1:250 000 BATHYMETRIC
MAPPING PROGRAM

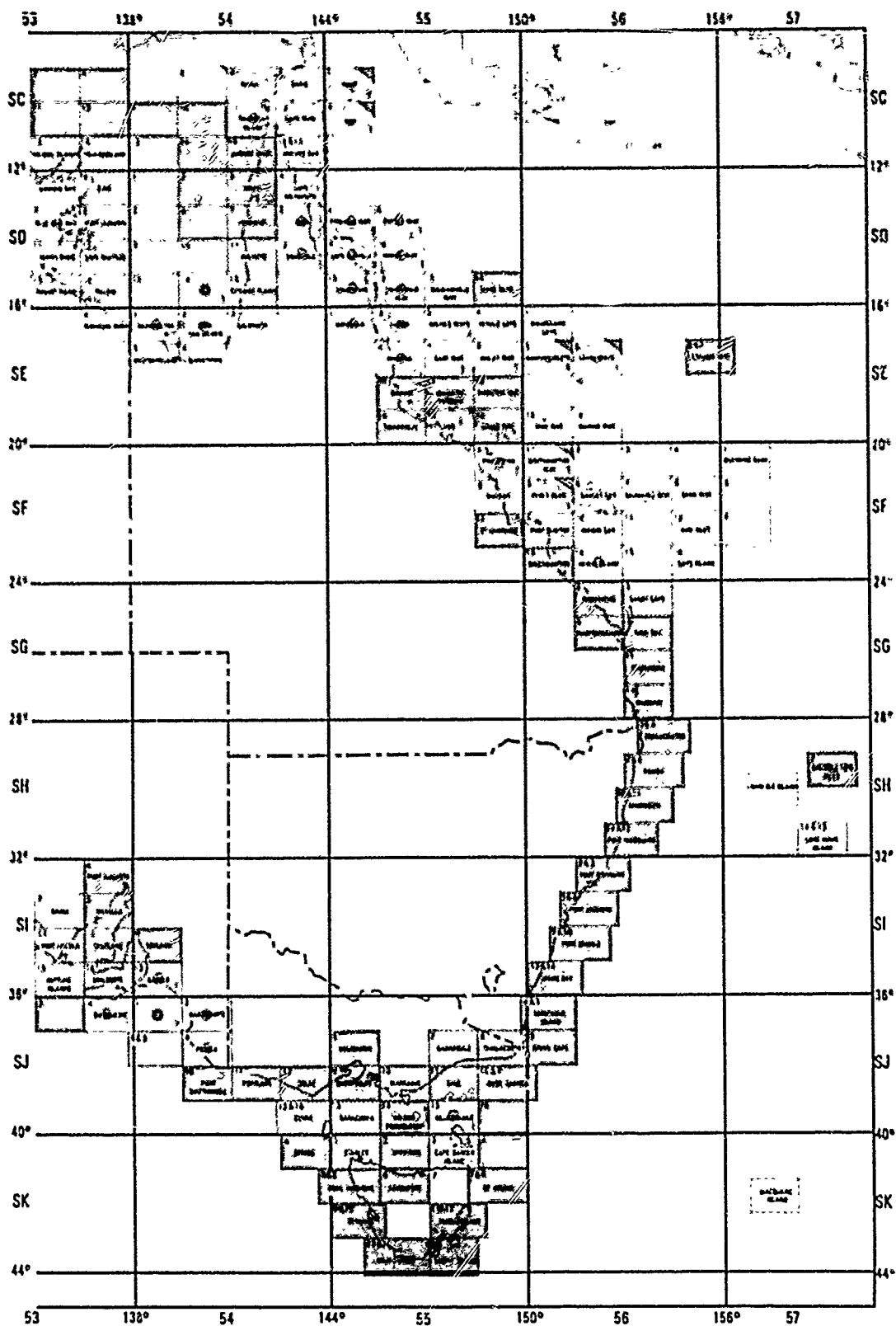


FIG. 11 B

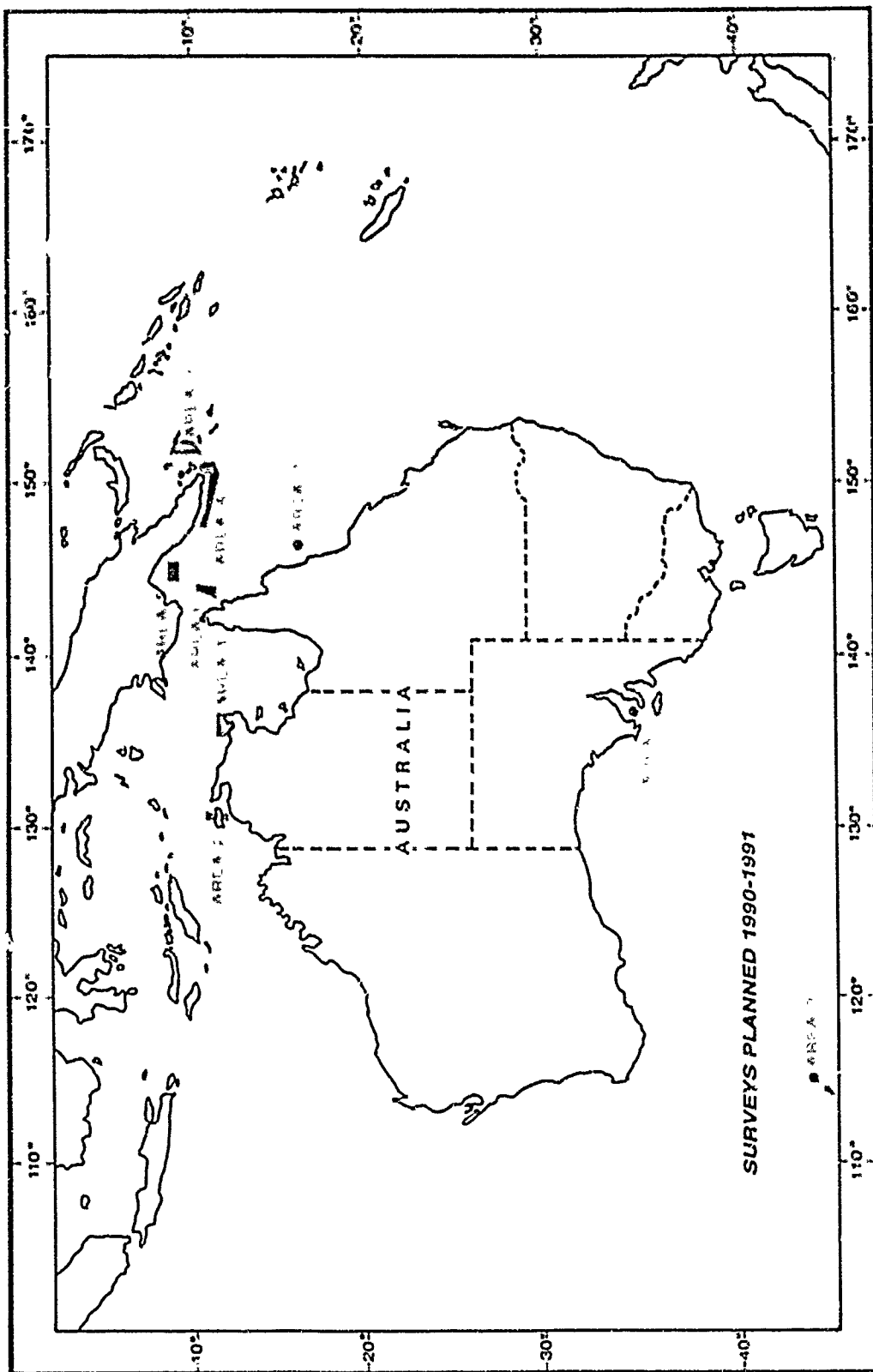


FIG. 12

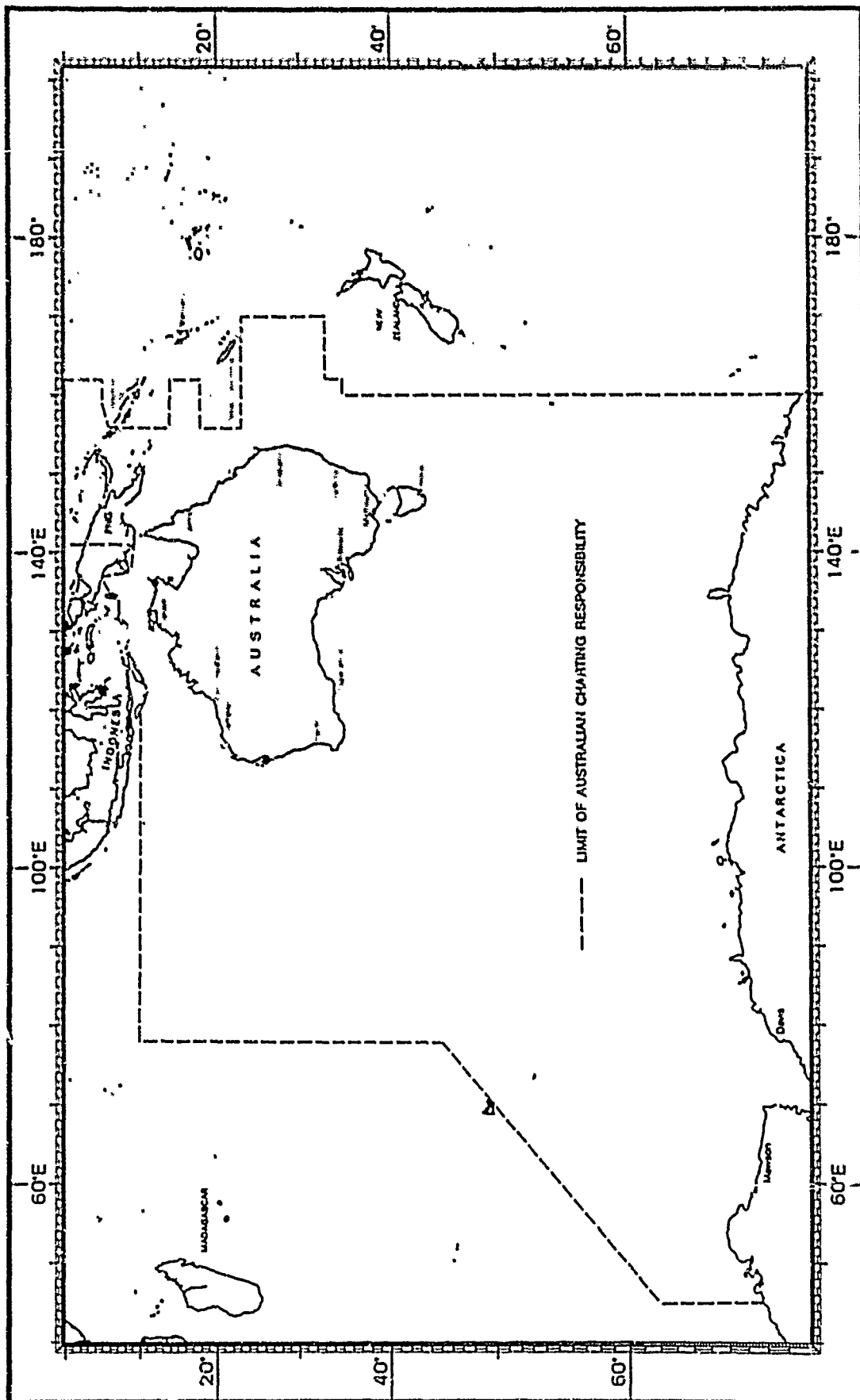


FIG. 13

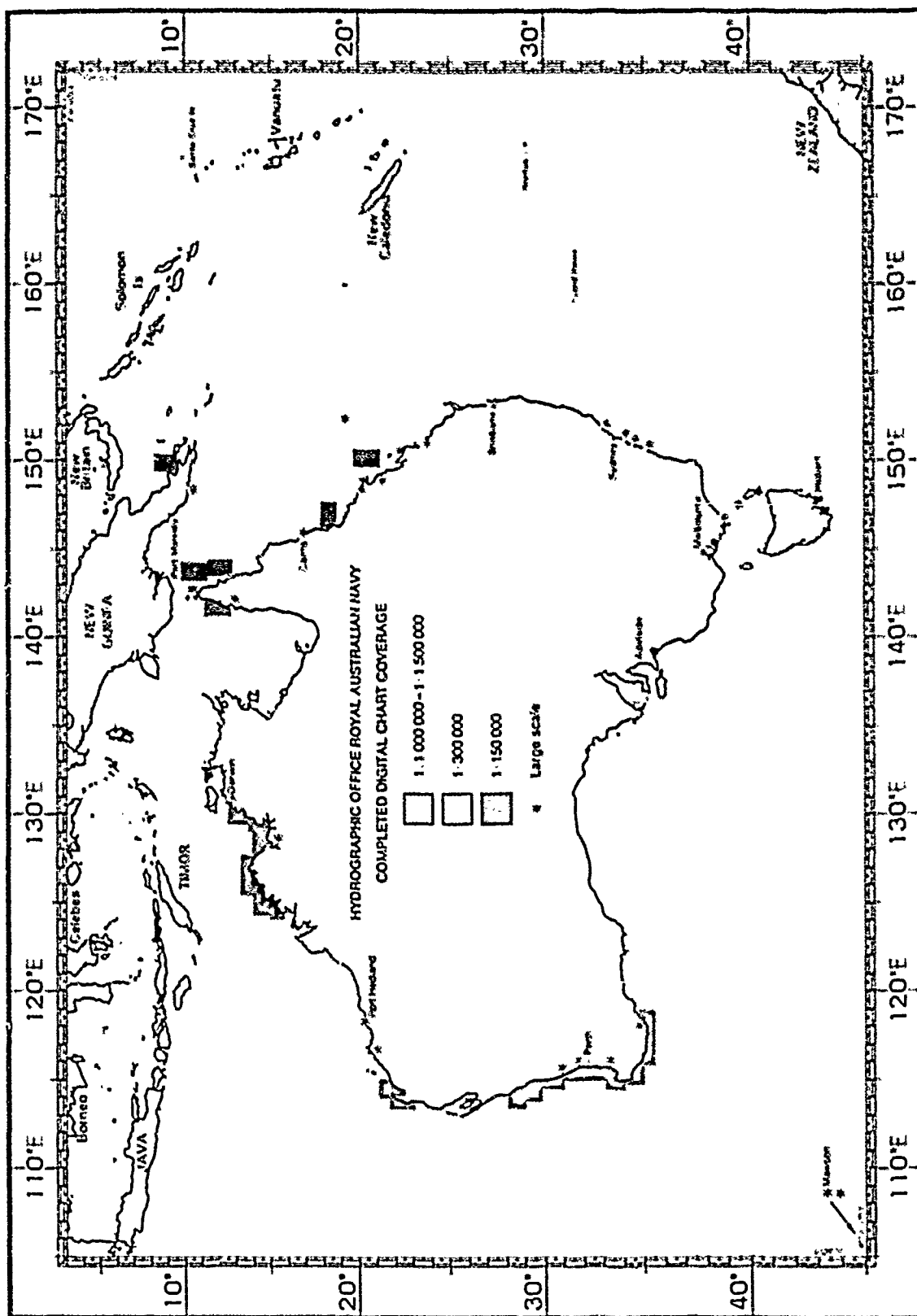


FIG. 14

DISTRIBUTION LIST

1. Departmental and Service Authorities

Department of Defence, for attention:

The Minister for Defence
Secretary, Department of Defence
Chief of the Defence Force
Vice Chief of the Defence Force
Chief of Naval Staff
Deputy Chief of Naval Staff
Assistant Chief of Naval Staff (Materiel)
Assistant Chief of Naval Staff (Personnel)
Director General, Naval Policy and Maritime Doctrine
Director General, Joint Operations and Plans
Director, Joint Intelligence Organisation
Director of Public Information
Assistant Secretary, Resources Planning - Navy
First Assistant Secretary, Financial Services and Internal Audit Division
Assistant Secretary, Defence Information Services Branch
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Maritime Commander Australia
Flag Officer Naval Support Command
Naval Officer Commanding, West Australia Area
Naval Officer Commanding, Victoria Area
Naval Officer Commanding, Queensland Area
Naval Officer Commanding, North Australia Area
Naval Officer Commanding, South Australia Area
Naval Officer Commanding, Tasmania Area
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Commodore, Naval Air Station, Nowra
Commander Australian Mine Warfare Force
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Commanding Officer, HMAS FLINDERS
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Commanding Officer, HMAS MERMAID
Commanding Officer, HMAS SHEPPARTON
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Commandant, Australian Defence Force Academy
Joint Services Staff College, Canberra
RAN Staff College, HMAS PENGUIN
RAN College, Jervis Bay
Naval Weather and Oceanographic Centre, HMAS ALBATROSS
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Hydrographic School, HMAS PENGUIN (4 copies)
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RANR Hydrographic Officers (10 copies)
Defence Research Centre, Salisbury
DSTO, Sydney

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Bureau of Mineral Resources
CSIRO Division of Fisheries and Oceanography
Secretary, Senate Standing Committee for Trade & Commerce
Department of Primary Industry, Fisheries Division
Great Barrier Reef Marine Park Authority, Canberra

Great Barrier Reef Marine Park Authority, Townsville
Department of Foreign Affairs (for AIDAB)
Australian Parks and Wildlife Service
Department of Transport and Communications (Maritime Operations Division) (4 copies)
Bureau of Meteorology, Melbourne
Surveyor General, New South Wales
Deputy Director-General (Land Information)
Department of Property and Services, Victoria
Surveyor General, Queensland
Surveyor General, South Australia
Director, Division of Mapping and Survey, Department of Land Administration, Western Australia
Director of Mapping, Department of Lands Parks and Wildlife, Tasmania
Director, Mapping and Information Division
Department of Lands and Housing, Northern Territory
Central Mapping Authority, New South Wales
Department of Public Works, New South Wales
Minister for Shipping and Aviation Support
Director, Australian Antarctic Division

3. Port and Marine Authorities

Chief Executive Officer, Association of Australian Port and Marine Authorities

Queensland

Division of Harbours and Marine, Brisbane
Port of Brisbane Authority
Bundaberg Harbour Board
Cairns Port Authority
Gladstone Harbour Board
Mackay Harbour Board
Rockhampton Harbour Board
Townsville Harbour Board

New South Wales

Maritime Services Board of New South Wales,
Sydney Ports
Hunter Ports
Illawarra Ports

Victoria

Port of Geelong Authority
Port of Melbourne Authority
Port of Portland Authority

Tasmania

Navigation and Survey Authority of Tasmania
Marine Board of Burnie
Marine Board of Circular Head
Marine Board of Flinders
Marine Board of Hobart
Marine Board of King I
Port of Devonport Authority
Port of Launceston Authority

South Australia

Department of Marine and Harbours, Adelaide

Western Australia

Department of Marine and Harbours, Western Australia
Albany Port Authority
Bunbury Port Authority
Dampier Port Authority
Esperance Port Authority
Fremantle Port Authority
Geraldton Port Authority
Port Hedland Port Authority
Pilbara Harbour Services

Northern Territory

Department of Ports and Fisheries, Darwin
Darwin Port Authority

4. Shipping Organisations and Pilot Associations

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Secretary, Australian Steamship Owners Federation
Manager, Shipping Operations, ANL
Manager, Shipping Operations, BHP
Manager, Shipping Operations, TNT Bulkships
Manager, Shipping Operations, Howard Smith
Secretary, Queensland Coast and Torres Strait Pilot Service (6 copies)
Secretary, Port Phillip Pilot Association

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International Hydrographic Bureau, Monaco
Hydrographer of Navy, (UK) (4 copies)
Hydrographer, Royal New Zealand Navy
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Chief Hydrographer, Government of India
Chief Hydrographer, Republic of Indonesia
Director, National Oceanic and Atmospheric Administration, USA
Scientific Adviser, Hydrography, Defense Mapping Agency, USA
Commanding Officer, USN Oceanographic Office
Mission Oceanographique du Pacifique, FMP, Noumea, New Caledonia
Surveyor General, Papua New Guinea
Department of Transport, Division of Marine, PNG (For Hydrographer)
Papua New Guinea Harbours Board
Chief Hydrographer Fiji
Adviser, Hydrographic Unit, Solomon Islands
Adviser, Hydrographic Unit, Vanuatu
The Librarian, PNG University of Technology

6. Research Organisations and Professional Bodies

The Victorian Institute of Marine Science
The Australian Institute of Marine Science, Townsville
The Hydrographic Society, Australasian Branch
The Australian Institute of Cartographers
The Institution of Surveyors, Australia
James Cook University of North Queensland
Ocean Sciences Institute, Sydney University
National Tidal Facility

7. Tertiary Educational Institutions (Libraries)

New South Wales

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University of New South Wales
Macquarie University
University of New England
Newcastle University
Wollongong University
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Queensland University
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Australian Capital

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Tasmania

University of Tasmania
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State Libraries (6 copies)
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40 copies

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